Cosmetology Department

Anatomy Info
ANATOMY AND PHYSIOLOGY

Anatomy and Physiology are subjects of considerable importance to the practice of cosmetology. Knowledge of this structure and functions of the human body forms the scientific basis for the proper application of beauty treatments. A basic understanding of these subjects will help to improve the professional skill of the cosmetologist. You will then know which beauty treatment for best results.

**Anatomy** is the study of the gross structure of the body, which can be seen with the naked eye, such as muscles, bones and arteries. You as cosmetologist are concerned only with those parts upon which you treat, such as the head, face, neck, arms, hands and feet.

**Histology or Microscopic Anatomy** is the study of the minute structure of the various parts of the body, such as skin and its appendages (hair, nails, sweat and oil glands).

**Physiology** is the study of the functions or activities performed by the various parts of the body.

**CELLS**

**Cells** are the basic units of all living matter; in humans, animals, plants and bacteria. Living cells differ from each other in respect to their size, shape, structure and function. In the human body, the cells are highly specialized and perform such vital functions as movement, thinking, digestion and reproduction.

All living cells contain **protoplasm**, a colorless jelly-like substance in which protein, fat, carbohydrate, water and mineral salts are present.

The **protoplasm of the cell** contains the following important structures:

1. **Nucleus** (dense protoplasm) found in the center and controlling the reproduction of the cell.
2. **Cytoplasm** (less dense protoplasm) is found outside of the nucleus and contains food materials necessary for the growth, reproduction and self-repairs of the cell.
3. **Centrosome**, a small round body in the cytoplasm, which also controls the reproduction of the cell.
4. **Cell membrane or wall** encloses the protoplasm, which permits soluble substances to enter and leave the cell.
**Growth of the cell**

As long as the cell receives an adequate supply of food, oxygen and water, eliminates waste products and is favored with proper temperature, it will continue to grow and thrive. However, if these requirements are not fulfilled and the presence of toxins (poisons) or pressure, then the growth and the health of the cells are impaired.

In the human body, the bone and nerve cells stop growing at maturity. Most body cells are capable of growth and self-repair during their life cycle. However, the delicate nerve cells are incapable of self-repair after injury or destruction by disease.

**Reproduction of the cell**

When the cell reaches maturity, reproduction may take place by direct or indirect division.

1. **Direct division**, or **Amitosis**, is a simple process whereby the cell increases in length, the nucleus and cytoplasm divide in half, forming two separate cells. **The method of reproduction occurs among bacteria and plant life**, but rarely takes place in human tissue.

2. **Indirect division**, or **Mitosis**, is a complex process whereby a series of changes occur in the nucleus before the cell divides in half. **This method of reproduction occurs in human tissues**.

**Metabolism**

**Metabolism** is a complex chemical process whereby the body cells are nourished and supplied with energy to carry on their many activities. In a healthy body, the metabolic rate is kept under control by a secretion from the **thyroid gland**.

**There are two phases to metabolism:**

1. **Anabolism**, a constructive process.
2. **Catabolism**, a destructive process.

During **anabolism**, the cells of the body absorb water, food and oxygen for the purposes of growth, reproduction and repair. In **catabolism**, the cells consume what they have absorbed in order to perform specialized functions, such as muscular effort, secretion or digestion.

**TISSUES**

**Tissues are composed of groups of cells of the same kind.** Each tissue has a specific function and can be recognized by its characteristic appearance. Body tissues are classified as follows:
1. **Connective tissue** serves to support, protect and bind together other tissues of the body. Bone, cartilage, ligament, tendon, and adipose tissue are examples of connective tissue.

2. **Muscular tissue** serves to contract and move various parts of the body.
   a. **Voluntary muscle tissue (striated)** is under the control of the will and permits the movements of muscles such as those of the face, arms and legs.
   b. **Involuntary muscle tissue (non-striated)** is under the control of special nerve centers which permit the movement of the intestines, stomach, and blood vessels.
   c. **Heart muscle tissue (cardiac)** permits the movement of the heart is the blood is pumped through it.

3. **Nerve or nervous tissue** serves to carry messages to and from the brain. It controls and coordinates body functions by means of nerve cells found in the brain, spinal cord and nerves distributed to muscles, skin, vital organs and glands.

4. **Epithelial tissue** serves as a protective covering on body surfaces such as on the skin, mucous membranes, and linings of the heart, digestive and respiratory organs and glands.

5. **Liquid tissue** serves as a carrier of food, waste products and hormones, by means of the blood and lymph.

**ORGANS**

**Organs** are structures containing two or more different tissues which are combined to accomplish a definite function. Among the important organs found in the body are the brain, heart, lungs, kidneys, and the various glands.

**SYSTEMS**

**Systems** are groups of organs which cooperate for a common purpose. The human body is composed of the following important systems:

<table>
<thead>
<tr>
<th>Skeletal System</th>
<th>Circulatory System</th>
<th>Respiratory System</th>
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<td>Muscular System</td>
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<td>Digestive System</td>
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<td>Nervous System</td>
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OSTEOLGY

Is the scientific study of bones, their structure and functions.

DEFINITION:

Tough elastic fibers forming the framework of the body. The skeleton is the part of the body everything is attached to. Bone is the hardest structure of the body.

FUNCTIONS: (or purpose of)

Keyword – FLAP
1. F – framework (forms a shape or frame to body)
2. L – levers (to move the muscles and makes locomotion possible)
3. A - attachment (attaches all parts of the body)
4. P - protection (for delicate organs of the body)

COMPOSITION OF BONES:

1. Inorganic, mineral or non-living, composed of calcium phosphate and carbonate of lime, and composes 2/3 of the bone.
2. Organic, animal or living, composed of bone, cells, connective tissue, marrow, blood vessel and composes 1/3 of the bone.

SHAPES OF BONES:

1. Flat bones – found in the skull
2. Long bones – found in the arms and legs.
3. Short bones – found in the fingers and toes.
4. Irregular bones – found in the vertebrae (spine)
STRUCTURE OF BONE:

Marrow – is located in the center of bones, fatty cells. Manufacturers red corpuscles for our body, and nourishes bones.

Cancellous Tissue – (spongy) is the soft, lacy inner part of the bone. Bone is light pink on the outside and deep red on the inside.

Compact Tissue – (dense, hard) located on the outer part of the bone, ivory-like tissue. Has small channels called Haversian canals (which contain minute blood vessels side in the nutrition of bones).

Periosteum – covering of bone, serves as attachment for ligaments, blood vessels, tendons, and nerves.

Cartilage – (also called gristle) acts as shock absorbers. It covers the ends of bones, gives shape and features to the nose and ears and it has no blood or nerves.

Synovial Fluid – acts as an oil or lubricant for our bones (at joints), prevents friction.


Articulation (joint) – bones of the body are all fastened together and the points of attachment are called articulations.

JOINTS: (movable articulations)
1. Movable – found in the fingers.
2. Slightly Movable- found in the spine
3. Immovable – found in the skull.

TYPES OF JOINTS:
1. Hinge – found in the elbows or knees.
2. Ball and Socket – found in the shoulder and hip.
3. Pivot – found in the neck
4. Gliding – found in the spine.
5. Condyloid – found in the wrist, and ankles.
LIGAMENTS - tough, fibrous tissue, band or sheets, binds bone to bone (wrist and ankle)
TENDONS – tough, fibrous tissue, binds muscles to muscles, and muscles to bones.

THERE ARE **206 BONES** IN THE BODY - **16% of the body weight**.

Bones of the CRANIUM (8 bones)
Keyword – F.S.POET
  F – Frontal (1) – upper front portion of head (forehead).
  S – Sphenoid (1) – platform for the brain, connects the bones of the cranium together, found back of eye-socket.
  P – Parietal (2) – sides and top of head.
  O – Occipital (1) – in back and lower part of head.
  E – Ethmoid (1) – between the eyes, forming nasal bones.
  T – Temporal (2) – sides of head at ear region, below parietal bones.

Bones of the Face (14)
Keywords – **Zelda Please Let Mary Visit Me To Night.**
  Z – Zygomatic – (2) malar bones, forming the prominence of the Cheek (lower part of the eye socket).
  P – Palate – (2) palatine forming roof of mouth.
  L – Lacrimal – (2) smallest bones of the face this forms the tear duct canal on each side of the eye orbit, most fragile.
  M – Maxillae – (2) maxillar forms the upper jaw bones.
  V – Vomar – (1) inside (middle) of nose, it shapes two nostrils.
  M – Mandible – (1) lower jaw, largest bone of the face and the strongest.
  T – Turbinal – (2) located both sides of nose.
  N – Nasal – (2) forms bridge of the nose between eyes.

BONES OF THE NECK AND CHEST (11)
Keywords – **Have Sue Call Cathy**
  H – Hyoid (1) – also known as the Adam’s apple its U shaped and supports the tongue.
  S – Scapula (2) – these are the shoulder blades.
  C – Clavicle (1) – this is the collar bone.
  C – Cervical Vertebrae (7) – this is the spinal column, located in the neck region.
BONES OF THE ARM (3)
Keywords – U. R. Here
- **U** – **Ulna** (1) – it’s a large bone found in the forearm on the little finger side.
- **R** – **Radius** (1) – a small bone found in the forearm on the thumb side.
- **H** – **Humerous** (1) – a long bone found in the upper arm.

BONES OF THE WRIST (8) AKA Metacarpal bones
Keywords – **Nick Mowed** **The Lawn**, **Patty Happily Made Cookies**
- **N** – **Navicular** – a capphoid
- **M** – **Greater Multangular** – located at the base of the thumb trapezium shaped.
- **T** – **Triangular** – cunsiform it has three angles.
- **L** – **Lunate** – semi lunar shaped like a half moon.
- **P** – **Pisiform** – is pea shape and is the smallest bone of the wrist.
- **H** – **Hamate** – is located at the base of the fourth and fifth metacarpals (trapezoid).
- **M** – **Lesser Multangular** – located second from the thumb, it has more angles (trapezoid).
- **C** – **Capitate** – located third from the thumb, largest bone in the wrist. (os magnum).

BONES OF THE PALM (5 bones)
Keywords – **May I Play Asked Alan**
- **M** – **Medius** – is the middle finger
- **I** – **Index** – is the forefinger
- **P** – **Pollex** – is the thumb
- **A** – **Annularis** – is the ring finger
- **A** – **Auricularis** – is the little finger

BONES OF THE FINGERS (14)
Keywords – David, Michael, Paul
- **D** – **Distal** – top bone or end of fingers
- **M** – **Medial** – middle bone of fingers
- **P** – **Promixal** – lower bone of fingers

Note: the thumb only has two bones.
PERSONAL APPEARANCE in height and body shape is determined by general body structure, which depends upon the skeleton.

DEFINITION: The scientific study of bones, their structure and functions is called Osteology (os-te-ol’o-je) OS is the technical term for bone.

THE SKELETAL (skel’e-tal) SYSTEM is the physical foundation or framework of the body. It is composed of differently shaped bones, cartilages and ligaments united by movable and immovable joints. The FUNCTION of the skeletal system is to serve as a means of protection, of support and of locomotion.

VARIATIONS- Bones vary according to race, sex and age, and from person to person. Individual variations are due to many causes, such as differences in size and weight of bones. Such differences are usually related to the height and muscular development of the individual.

BODY REGIONS

The skeleton is divided into THREE MAIN REGIONS: the skull, the spine and the limbs.

1. THE SKULL: Several bones unite together to form the skull, which protects the brain. The skull rotates on the spine. This position of the skull makes more acute the senses of seeing, smelling, and hearing as the skull is moved in different directions.

2. THE SPINE or BACKBONE: is made up of many irregular-shaped bones called vertebrae. Elastic tissue between the vertebrae permits some flexibility of the spine. The spinal column helps to keep the body and head erect. The ribs are attached to the spine. They run circularly around the body and meet in front at the breastbone. The ribs aid in respiration. They form the chest cavity which holds the heart and lungs.

3. THE LIMBS: Each of the two upper limbs terminated in a hand with five fingers. Each of the two lower limbs terminates in a foot with five toes. The lower limbs help the body to stand erect and move about. The upper limbs permit easy movement and give the ability to use tools, instruments and utensils.
BONES

COMPOSITION: Bone is the hardest structure of the body, and is composed of about one-third organic or animal matter and two-thirds inorganic or mineral matter.

1. THE ANIMAL (organic) matter consists of bone cells, blood vessels, connective tissue, and marrow
2. THE MINERAL (inorganic) matter consists mainly of phosphate and carbonate of lime.

DESCRIPTION of bones:

APPEARANCE: Externally, bone appears to be light pink in color, internally, deep red.

BONE TISSUE: There are two types of bone tissue: cancellous (spongy) and dense (compact).

1. The Compact (kom-pakt’) Tissue forms the hard bone found in the shafts of long bones, and on the outside of flat bones. The compact bony tissue has small channels, called Haversian canals, containing minute blood vessels.

2. The Cancellous (kan’sel-us) Tissue forms the interior of bones, the ends of bone shafts, and the very thin bones. It consists of a meshwork of bony arches through which blood vessels and nerves pass.

MARROW (mar’o) is a soft fatty substance filling the cavities of bones, whose function is largely concerned with the formation of red blood cells. It also nourishes bone.

PERIOSTEUM (per-e-os’ te-um) is the covering of the bone. It is a fibrous membrane, the function of which is to protect the bone and also serve as an attachment for tendons, ligaments, blood vessels and nerves.

NUTRITION bone receives its nourishment through blood vessels (capillaries) which make their way through the PERIOSTEUM into the interior of bones.
FUNCTIONS and SHAPES of bones

Functions of bones are:
1. To give shape and strength to the body.
2. To protect organs from injury.
3. To serve as an attachment for muscles.
4. To act as levers for all bodily movements.

FORMS or SHAPES. There are several forms or shapes of bones found in the human body, mainly:
1. Flat bones, as the skull
2. Long bones, as the legs and arms.
3. Short bones, as the fingers and toes.
4. Irregular bones, as the vertebrae (spine)

The various skeletal bones are connected at different parts of their surface, and such connections are called joints or articulations.

JOINTS

A joint is the point of union or junction of two or more bones. The various kinds of joints come under the following classifications:

1. Movable, as in fingers.
2. Immovable, as in the cranium
3. Slightly movable, as in the spine.

Types of joints. The various types of joints found in the human body are:

1. Pivot joint – One bone turns on another with a rotating motion. An example would be the neck.

2. Hinge joint – Two or more bones are connected like the hinge of a door. An example would be elbow and knee.

3. Ball and socket joint – One bone is rounded and fits into a socket. An example would be hips and shoulders.

4. Gliding (sliding) joint – Two bones glide over each other. An example would be spine, ankle and wrist.
CARTILAGE and LIGAMENTS

CARTILAGE (kar’ti-l ij) also called gristle is a firm and tough elastic substance, similar to bone but without its mineral content. It serves the following purpose:
1. Cushions the bones at the joints
2. Prevents jarring between bones in motion, as when walking.
3. Gives shape to certain external features, such as the nose or ears.

LIGAMENTS (lig’ah-ments) are bands or sheets of fibrous tissue, which help to support the bones at the joint, such as the wrist or ankle.

THE SYNOVIAL (si-no’ve-al) FLUID, a lubrication fluid, prevents friction at the joints. In appearance it is a sticky fluid, much like egg white in consistency. It also furnishes nourishment to cartilage.

BONES of the NECK and THORAX

Cervical Vertebra – Seven (7) in numbers:
1. Supports the head (atlas)
2. Extends up into the atlas (axis) permits head to move from side to side
5 remaining come within the region of scalp and facial massage.
7. Dowager’s hump.

THORIC VERTEBRAE – Twelve (12) in numbers
Extend from neckline to waist. They are larger and stronger than cervical vertebrae.

ENTIRE VERTEBRAE – Twenty-six (26) in numbers

Ribs – Twenty-four (24) in numbers – twelve (12) on each side
7 pairs – Fastened to Sternum
3 pairs – Fastened to above ribs (allows the expansion in breathing).
2 pairs – Floating ribs.

1. Sternum – Breast bone
2. Clavicles – Collar bones (support the arms)
3. Scapulae – Shoulder blades
BONES OF THE HEAD

There are eight (8) bones of the head (*cranium*).

1. **Occipital** – located at the back and lower part of the skull.
2. **Parietals** – located on both sides of the skull and joined on top, forming the sides and roof of the cranium.
1. **Frontal** – forms the forehead and also the bony sockets for the eyes and nose.
2. **Temporal** – forms the sides and base of the skull.
1. **Ethmoid** – forms the roof of the nasal cavity and part of the orbits.
1. **Sphenoid** – located inside lower portion of the skull where it joins other cranial bones together; key bone of the cranium; shaped like a butterfly with wings extended; ends of wings form temple.

All but the **Ethmoid** bone come within the region of scalp massage.
BONES OF THE FACE

There are fourteen (14) bones of the face.

(2) Nasals - shape the ridge of the nose, cartilage on end.

(2) Lacrimals – form the inner wall of the eye socket. (most fragile)

(2) Zygomatics (Malars) – form the prominence of the cheek.

(2) Maxillae (Superior Maxillaries) – compose the sockets for the upper teeth; also forms the entire jaw, lower part of the lower part of the sides of the nose and a part of the eye sockets.

(1) Mandible (Inferior Maxillary) - produces the chin and the entire lower jaw. Sockets for lower teeth. (strongest and largest)

(2) Palatines (Palates) - form the back of the roof of the mouth.

(2) Turbinals (Inferior Nasal Couchae) – scroll shaped bone situated in the nostril on the outer wall of each side.

(1) Vomer - located at the lower and back part of the nasal cavity. Forms part of the central septum.

Cervical vertebrae – First seven bones of the spine

Hyoid - U shaped bone just above the Adam’s apple; supports the tongue.

BONES not affected by MASSAGE
Vomer, Lacrimals, Turbinals, Palates, Hyoid

BONES which form the EYE SOCKETS
Frontal, Superior Maxillary, Zygomatic, Lacrimal, Ethoid
MYOLOGY

Myology – is the scientific study of muscles, their structure and functions.

Definition – Contractile, elastic, fibrous tissue, vary in size and length. The muscular system covers, shapes, and supports the skeleton, and its function is to produce all movements of the body.

Description – Red-lean meat, about one-half the body weight, about 500 in body composed of cells, long and short.

Classification of Muscles (Muscles are in bundles)
1. Striated – Voluntary muscles. Controlled by the will. The skeletal muscles.
3. Cardiac – involuntary muscle, surrounding the heart.

Characteristics of Muscles
1. Excitability or irritability – power to response to stimuli.
2. Contractibility – ability to change shape, and become shorter and thicker.
3. Extensibility – ability to stretch.
4. Elasticity – ability to recover original shape.
5. Muscle Tone – normal degree of tension with which the muscle responds to stimulation.

Attachments –
Muscles are attached to bones, cartilage, ligaments, tendons, and sometimes to each other.
Fascia – is a delicate membrane of connective tissue, covers muscles, and separates their numerous layers.

Tendons – connects muscle to bone, sometimes called sinews.

Ligaments – Connects bone to bone.

Aponeurosis – connects muscle to muscle. It is a flat, extended tendon or fibrous sheet.

Origin of Muscle – more fixed attachment.

Insertion of Muscle – more moveable attachment.
Belly of the muscle – the intervening part between the origin and insertion.

Stimulations (Muscles can be affected by these things) KEYWORD: CEMENT

- **Chemical** – acids or salts
- **Electrical** – electrical facials, high frequency or scalp manipulations
- **Massage** – body massage, stimulates or relaxes muscles, by hand vibrator
- **Electric Lights** – stimulates, infra-red and ultra-violet rays
- **Nerve Impulse** – shock treatments, through nervous system
- **Thermal** – heat or cold, stimulates, hot packs, heating caps.

Each muscle is supplied with its own nerves, blood vessels and lymph.

MUSCLE FATIGUE – Accumulation of waste in the tissue.

Terms to know:
- **Anterior** – in front of
- **Posterior** – in back of
- **Superior** – higher or above
- **Inferior** – lower
- **Anguli** – at an angle
- **Levator** – lifts or leverage
- **Lateral** – on the side
- **Dilator** – enlarges, expands, open
- **Depressor** – release, draws down
- **Medial** – in the middle
- **Proximal** – nearest from center
- **Distal** – farthest away
- **Constrict** – close

Varieties

1. **Voluntary** (striated) – directed by the will, under control of Cerebro-Spinal Nervous System. Appear striated or stripped under the microscope.

2. **Involuntary** (non-striated) – muscle tissue function without the action of the will. They are controlled by the sympathetic nervous system.

3. **Cardiac** (heart) – muscle tissues perform involuntary functions. They are composed of cells which are not as distinctly striated as the cells of skeletal muscle.

MUSCLES OF THE SCALP

1. **Frontalis** – draws scalp forward, and produces wrinkles on the forehead.
2. **Occipitalis** – back of the head; draws scalp backwards
3. **Galea Aponeurotica** – broad, flat, extended tendon; joins the occipitalis and frontalis together.
4. **Epicranius** – are the above three
MUSCLES OF THE EYE (three)
1. Levator Palpebrae Superioris – upper eyelid raises and opens eye
2. Orbicularis Oculi – completely surrounds orbit, acts to open and close eye raise or lower eyelid. Known as the winking muscle.
3. Corrugator – located between two eyebrows in lower part of forehead. Known as the frowning muscle.

MUSCLES OF THE EAR (three)
1. Anterior Auricularia – in front of the ear
2. Superior Auricularis – above the ear
3. Posterior Auricularia – behind the ear

MUSCLES OF THE NOSE (five)
1. Procerus – across bridge of nose, acts to wrinkle nose
2. Nasalis – begins at base of nose, and extends over bridge
3. Depressor Septi – extends across base of nose to septum. Acts to compress the nostrils as in anger.

MUSCLES OF THE MOUTH (nine)
1. Orbicularis Oris – circular muscle completely surrounding the mouth. Know as the kissing muscle
2. Mentalis – in chin, wrinkles chin as in doubt
3. Quadratus Labi Inferius – in lower lip, and draws down lower lip. (pouting muscle)
4. Triangularis – begins on the mandible and extends to corners of mouth. Acts to draw down the corners producing a doleful expression
5. Risourius – extends from just above the masseter muscle to corner of mouth. Acts to draw out corners of mouth (grin)
6. Buccinator – in check, trumpeteter muscle, compresses cheeks as in blowing (blowing muscle)
7. Zygomaticus – extends from zygomatic bone to corner of the mouth. Known as the laughing muscle
8. Caninus – located in upper lip above canine tooth. Raises upper lip producing a sneer or a snarl. (sneering muscle)
9. Quadratus Labii Superioris – located in upper lip, raises upper lip

MUSCLES OF MASTICATION (four, chewing)
1. Temporalis – located at the side of the head where it covers the temporal bone. It acts to close the teeth
2. Masseter – located an angle of the jaw. It also acts to close the teeth
3. Pterygoid Externus – located behind the angle of the jaw. Helps to close mouth and rotate jaw
4. Pterygoid Internus – located along side of externus. Assist to crushing or grinding action of jaw
MUSCLES OF THE NECK (three)
1. **Platysma** – a broad flat sheet of muscles located in the anterior part of the neck. Acts to produce wrinkles in the neck and depress in lower jaw.
2. **Sterno-cleido Mastoid** – located at side of neck just behind the ear. Acts to draw the head to one side or the other, and to rotate the head.
3. **Trapezius** – located at the back of neck and shoulder. Acts to draw the head from side to side.

MUSCLES OF THE SHOULDER AND UPPER ARM (seven)
1. **Deltoid** – a large triangular muscle covering the shoulder joint. Raises the arm.
2. **Subscapularis** – protects front of shoulder.
3. **Latissimus Dorsi** – rotates the arm down when arm is raised.
4. **Biceps Brachii** – two headed muscle on front of arm, radius side. Bends the elbow and shoulder.
5. **Triceps Brachii** – three headed muscle on back of arm, the ulna side. Extends the forearm
6. **Pectoralis Minor** – draws the arm upward, downward, and forward
7. **Pectoralis Minor** – draws the scapula forward and backwards.

MUSCLES OF THE FOREARM, WRIST, AND HAND (seven)
1. **Pronators** – turn the hand downward
2. **Supinators** – turn the hand upwards
3. **Flexors** – bends the elbow, wrist and fingers
4. **Extensors** – extends the elbow, wrist and fingers
5. **Adductors** – of the fingers, brings fingers together
6. **Abductors** – of the fingers, separates the fingers
7. **Lumbricales** - four small muscles located in the palm of the hand
SCALP - 2 muscles
1. **Epicranius** - consists of two parts, the frontalis and occipitalis.

2. **Frontalis** - raises the eyebrows; wrinkles forehead.
   *Origin* - aponeurosis.
   *Insertion* - Tissues of eyebrows.

3. **Occipitalis** - draws scalp backward.
   *Origin* - Occipital bone.
   *Insertion* - aponeurosis.

**Galea Aponeurotica** - flattened *tendon* that joins the Frontalis and Occipitalis muscles.

EYES - 3 muscles
4. **Corrugator Superficialis** - draws eyebrows downward and inward (*frowning*).
   *Origin* - at inner end of eyebrow near nose.
   *Insertion* - skin about half-way across orbital arch.

5. **Orbicularis Oculi** - closes eyelids (*sleeping - winking*).
   *Origin* - upper part of nasal, frontal and lacrimal bones.
   *Insertion* - skin at outer corner of eye and near its own origins.

5A. **levator Palpebrae Superioris** - opens the eye.
   *Origin* - sphenoid bone.
   *Insertion* - skin of the upper lid.

NOSE - 5 muscles
6. **Procerus** - wrinkles the nose.
   *Origin* - lower part of nasal bone.
   *Insertion* - skin between and just above the brows.

7. **Nasalis** - compresses nostrils.
   *Origin* - maxilla bone above canine tooth.
   *Insertion* - skin at lower bridge of nose.

8. **Depressor Septi** - contracts the opening of the nostrils.
   *Origin* - a depression in front of maxilla.
   *Insertion* - septum and back part of wing of nose.

9. **Dilator Naris Posterior**: dilates the nostrils.
10. **Dilator Naris Anterior**: dilates the nostrils.
   - **Origin**: nasal notch of maxilla bones.
   - **Insertion**: skin near margin of nostril

**MOUTH - 9 muscles**

11. **Quadratus Labii Superioris**: raises upper lip.
   - **Origin**: Maxilla next to nose, lower margin of eye socket and zygomatic bones.
   - **Insertion**: Cartilage wing and skin of nose, Orbicularis oris and upper lip.

12. **Caninus**: raises angle of mouth and draws it inward (*snarling*).
   - **Origin**: Canine depression of maxilla
   - **Insertion**: Skin at angle of mouth.

13. **Zygomaticus**: raises angle of mouth upward and outward (*laughing*).
   - **Origin**: Outer arch of Zygomatic bone.
   - **Insertion**: Skin at angle of mouth.

14. **Mentalis**: wrinkles skin of chin and protrudes lower lip.
   - **Origin**: Depression of mandible.
   - **Insertion**: Skin of chin.

15. **Quadratus Labii Inferioris**: draws down lower lip.
   - **Origin**: Oblique line of mandible.
   - **Insertion**: Skin of lower lip.

16. **Triangularis**: pulls down corners of mouth (*Scorn*).
   - **Origin**: Oblique line and lower jaw bones.
   - **Insertion**: Skin at lower lip near angle of mouth.

17. **Buccinator**: used in inflating cheeks (*blowing*).
   - **Origin**: Portions of upper and lower jaw bones.
   - **Insertion**: Angle of mouth.

18. **Orbicularis Oris**: opens and closes mouth and protrudes lips.
   - **Origin**: Other mouth muscles surrounding Orbicularis Oris.
   - **Insertion**: Acts as an insertion for other mouth muscles.

19. **Risorius**: draws out angle of mouth (*grinning*).
   - **Origin**: Fascia near, over masseter.
   - **Insertion**: Skin at angle of mouth.

**MASTICATION - 3 muscles**

20. **Masseter**: closes jaw; largest muscles of the face (*chewing*).
   - **Origin**: Arch of Zygomatic bone
   - **Insertion**: Lower border and corner of mandible.

21. **Temporalis**: closes jaw (*biting*)
   - **Origin**: Temporal bone.
   - **Insertion**: Anterior border of lower jaw.
Muscles of the Head, Face, and Neck (Con't)

**Pterygoideus Internus** - closes the jaws.

**Externus** - opens the jaws.

*Origin* - Lower part of Sphenoid and Palate bone

*Insertion* - Into the lower part of the mandible.

**NECK - 3 muscles**

22. **Platysma** - depresses lower jaw; wrinkles skin of neck.

*Origin* - From the upper part of the Clavicle.

*Insertion* - Into mandible and lower part of mouth.

23. **Trapezius** - draws head backwards and sideways.

*Origin* - Occipital bone

*Insertion* - Scapula and spine.

24. **Sterno-cleido-mastoideus** - rotates head and pulls it forward (*nodding*).

*Origin* - Sternum and Clavicle.

*Insertion* - Mastoid process of Occipital bone.

**EAR - 3 muscles**

25. **Auricularis Superior (Attolens Aurem)** - slightly raises ear

*Origin* - Aponeurosis.

*Insertion* - Back of ear.

26. **Auricularis Posterior (Retrahen Aurem)** - draws ear backward.

*Origin* - Mastoid Portion of Temporal bone.

*Insertion* - Back of ear.

27. **Auricularis Anterior (Attrahen Aurem)** - draws ear forward.

*Origin* - Frontalis and Aponeurosis.

*Insertion* - Front if ear.
The first term you should know is chemistry. **Chemistry** is a science concerned with matter and the way it changes. This definition sounds simple, but the rest of this chapter will be devoted to showing just what this statement means.

**MATTER**

It is a hot summer day. The room is “stuffy,” so you walk over to the window and open it. A cool breeze blows in the window and the room feels much more comfortable. But now you are thirsty, so you go into the kitchen for a nice, cold glass of ice water. You turn on the faucet and watch the glass fill with water. Then you go to the refrigerator and put in a few ice cubes.

In these actions you have just come in contact with all 3 forms of matter. Matter is all around us, it is everywhere. In chemistry, matter is defined as anything that has weight and takes up space. The 3 forms of matter that you saw on that hot summer day are: Solid (the ice cubes), Liquid (the water), and the Gas (the air).

As a cosmetologist, you will work with all 3 forms of matter every day. You probably have already realized on category of matter you will work with: solid (a client’s hair, fingernails, and skin). But the various products that you will use every day are other, maybe better, examples. They come in all forms, solids, liquids, and gases and it is very important to know what kind of product you are using because they act differently.

Scientists usually talk about 2 branches of chemistry: organic and inorganic. Until a little over a hundred years ago, scientists defined **organic chemistry** as the study of matter that comes from life processes; that is, it is either alive or once was. **Inorganic chemistry** is the study of matter that is not alive and never was.

There is an easy way to remember this distinction. You may have heard of the old phrase “animal, vegetable, or mineral”. It is one way of saying all matter. Animal and vegetable describe everything that is or was alive. (In addition to obvious examples, this includes a wooden desk, which came from a tree, and the oil in your car, oil was formed millions of years ago from dead plants and animals). The last part of that phrase, mineral, describes inorganic matter. Rocks and metals are examples of inorganic matter. This difference between organic (living) and inorganic (non-living) matter should be a convenient and useful one for your purposes, but keep in mind that it is not really this simple. Scientists have been able to make many combinations of organic matter in laboratories. So, the distinction between organic and inorganic is much more complicated that the difference between rocks and trees, but it should fit your purposes in most cases as long as you keep in mind that it is a useful working definition rather than one that is 100 percent accurate in a scientific sense.

Another important term is related to matter: **substance**. A substance is a unit or part of matter that has a particular set of qualities that define what it is. Substance can be changed in 2 ways. You make a physical change in a substance. If you do this, you may change the way it looks, but you **will not change its makeup**. For example, you may
change the way an ice cube looks by letting in sit in the open air, but you will not change the makeup: It will be liquid water instead of frozen water, but it will still be water.

A chemical change is different. If you chemically change a substance, you destroy it. You will still have a substance, but it will be a new one. For example, when you combine hydrogen and oxygen, you create hydrogen peroxide, which is very different from either hydrogen or oxygen alone.

CHEMISTRY, ORGANIC AND INORGANIC

As you know, chemistry is a science that is concerned with the makeup and changes of both kinds of matter, organic and inorganic. Organic chemistry is concerned with combinations of carbon, especially one type called hydrocarbons, in matter. Most combinations of carbons are organic. Inorganic chemistry is concerned with the study of matter that does not have carbon in it. The simplest example is minerals. Many occur in nature, and scientists have learned how to make new combinations of inorganic matter. Inorganic chemistry is concerned with the study of both of these. There are a few examples of inorganic matter that contain carbon. One is carbon dioxide, which is what you exhale when you breathe. Two others are diamonds and lead pencil.

CHANGING THE FORMS OF MATTER

Matter appears in nature in many shapes and forms. One of the achievements of science has been the way scientists have been able to show how matter changes and to make up new combinations of matter. There are two basic ways that the form of matter can be changed: physically and chemically.

You have already read about physical changes in this chapter. When you opened the window to let a cool breeze into your house, you created a physical change: you lowered the temperature inside the house. Another example of this kind of change is the ice cube will melt. Heat caused the physical change.

Another way to cause a physical change is force, or pressure. If you dropped the ice cube on the floor or you smashed it into little chips, the ice cube’s form would be changed: it is not an ice cube anymore.

These changes have one thing in common: the form of the matter is changed but not what makes it up. The ice cube is still water. Only its form has been changed.

Chemical changes are different. Matter is changed chemically when another kind of matter is added to or taken away from it. The result of a chemical change is something new and different. If you think of yourself as a “master chef”, there may be many examples of very complicated combinations of chemicals right in your kitchen, in the seasoning you use. But even if you aren’t, there is one simple example of a chemical change in almost everyone’s kitchen: salt. Salt is made of sodium (a metal) and chlorine (a gas). They are two completely different kinds of substances, but when they are combined, the result is something completely different from either sodium or chlorine: sodium chloride (salt). This is a chemical change: what the substances actually are is changed. As you have probably guessed, the products you will use sometimes are very complicated combinations of chemicals.

Heat also plays an important part in chemical changes. Some chemical changes need heat to take place. Others give off heat when they do take place.
There are two kinds of chemical changes: synthesis and decomposition. You will read more about these changes later in this chapter.

ELEMENTS AND COMPOUNDS

Salt is a simple combination of chemicals. This kind of combination is called a compound. Compounds can be very complicated, but all of them are made from elements.

Do you know how many letters there are in the alphabet? Of course, there are 26. And with only 26 letters we can make thousands of words. This is similarly true for elements. Elements are the basic units of substances. Although there are only 105 elements (92 can be found in the natural world; 13 have been created by scientists), they can be combined to form an almost limitless number of compounds.

At one time scientists thought that elements were the smallest kind of matter in creation. But later they learned differently. Elements are made up of atoms, which are much smaller than elements and cannot be seen by the unaided eye. An atom is the basic part of an element. An element such as hydrogen or oxygen has only one kind of atom.

An atom can be broken into smaller parts, but it is no longer an element. For example, if you broke up an atom of sodium, you would no longer have an atom of sodium. You would have a sodium ion.

Here is how it works. An atom has, basically, 3 kinds of particles—protons, electrons, and neutrons. Protons and electrons have power which scientists call an electrical charge. Protons have a positive (plus) charge and electrons have a negative (minus) charge. The core of the atom sometimes contains neutrons, which do not have a charge. Normally, an atom has the same number of positive and negative charges, so they balance each other off. When the number of protons and electrons is not equal, you have an ion. The number of electrons an atom has is what gives it the ability to combine with other atoms in chemical reactions.

Sometimes an atom gains an electron from an atom of another element. The atom that gained an electron is called a negatively charged ion (it has one more electron, negative charge-than proton).

This is the chemical process that goes into making a compound. Atoms gain or lose electrons and become joined to each other and form a molecule. This form is a compound. An atom is to an element what a molecule is to a compound. If you break up an atom of an element, you no longer have a compound.

The earlier example of salt will help you see this. Sodium and chlorine are the 2 elements of salt will help you see this. Sodium and chlorine are the 2 elements in this compound. An atom of sodium gives up one of its electrons to an atom of chlorine. The result is 2 ions: 1 sodium, the chlorine. The sodium ion does not have all of the characteristics of the element sodium because it is not a complete atom. The same thing is true for the chlorine. They form the compound sodium chloride, which is totally different. If you wanted to separate the sodium and chlorine, you would destroy the compound.
PHYSICAL AND CHEMICAL PROPERTIES

The difference between physical and chemical changes is due to the properties of substances. The physical state of a substance is one of its properties. Other includes its color and odor. Physical changes do not change the chemical makeup of a substance. They can be reversed.

A substance’s chemical properties are the ways it reacts when it is combined with another substance. One chemical property of hydrogen is its ability to attract or draw oxygen atoms from other elements.

There are two kinds of chemical changes: synthesis and decomposition (or analysis). Synthesis involves the creation of a compound by combining elements of simpler compounds. Decomposition (or analysis) involves breaking down a compound into its parts.

Any chemical change results in a change in chemical energy. A chemical change is often more difficult to observe that a physical change, such as burning wood. But one example is the use of hydrogen peroxide. When you apply it to the hair, it gives up an atom (ion) of oxygen. The chemical formula for peroxide is H2O2. When it loses oxygen, it becomes water (H2O).

TYPES OF MIXTURES: SOLUTIONS, COLLOIDS, AND SUSPENSIONS

MIXTURES

As you read earlier in this chapter, compounds are combinations of elements that are joined by chemical means. Mixtures are combinations of elements or compounds, or both, but there are different kinds of combinations. They are only joined physically. This means that the individual parts of a mixture keep their own properties and can be separated easily by physical or mechanical means. Face powders are mixtures. The human skin also as mixtures (the body contains various kinds of oils). They can take these forms: solid, liquid, or gas.

Because many important cosmetic preparations are mixtures, it is important to know the different kinds of mixtures. There are 3 kinds of mixtures: solutions, colloids, and suspensions.

SOLUTIONS

The solutions are homogeneous mixtures of 2 or more substances or compounds. This means that they have the same proportion of the elements or compounds that are in them throughout the mixture. At any place in a mixture that has 35 percent hydrogen, 35 percent oxygen, and 30 percent formaldehyde, you will find those percentages of ingredients. The particles are so small that they cannot be seen separately by looking at them through a microscope.

Two examples of solutions in different physical states are: (1) air- gases (oxygen, etc.) dissolved in a gas (nitrogen), and (2) formalin - gases (formaldehyde) dissolved in a liquid (water). Most solutions used in the salon are either liquids dissolved other liquids or solids dissolved in liquids.
Two terms are important in the use of solutions. The particles are dissolved in the solvent. The particles that dissolve are called the **solutes** (sahl-yoots). Water, alcohol, and glycerin are the most commonly use solvents in salon products, although many others can be solvents.

There can be 3 kinds of solutions, depending on the amount of solute used. **Dilute** solutions have only a small percentage of solute in them; **concentrated** solutions have a much larger percentage; and **saturated** solutions have as much of a solute as a solvent can dissolve at a particular temperature (heat can affect the ability of a solvent to dissolve a solute).

**COLLOIDS**

**Colloids** are mixtures containing particles that are larger that those in a solution. They have only a **slight** tendency to settle. The particles of the colloid are called **colloidal particles**; the substance in which the particles are distributed is called the **dispersing medium**. Colloids can be dispersed in substances in any of 3 physical states. Some colloids include:

1. liquid aerosol - a liquid dispersed in a gas
2. solid aerosol – a solid dispersed in a gas
3. liquid emulsion – a liquid dispersed in a liquid
4. sol – a solid dispersed in a liquid

It is especially important for you to know about **liquid emulsions**, since many preparations are in this form. Emulsions contain tiny droplets of one liquid suspended in another liquid. Salon emulsions are usually oil-in-water mixtures. If emulsions are allowed to stand, the 2 types of ingredients can separate into layers. However, the emulsions sold by cosmetics manufacturers usually contain an **emulsifying agent**, which breaks the oil into very small droplets and keeps them from coming together again. Thus, the agent forms a smoother, more stable mixture. Many salon creams and lotions are emulsions.

**SUSPENSIONS**

**Suspensions** are mixtures of a solid and a liquid or a solid and a gas. The solid particles in suspensions will settle out (separate) when the preparation is allowed to stand. Because of the large size of these particles, suspensions have a cloudy appearance.

**ACIDS, BASES, SALTS, AND pH**

**Acids** and **bases** are compounds. They are used in many hair care products because their effects on the hair are predictable. You can understand how acids and bases work by looking at the structure of compounds. As you read earlier in this chapter, an atom is the basic unit of an element and a molecule – a combination of atoms – is the smallest basic unit of a compound. An ion is a particle that has a charge. An ion has a “positive” or “negative” electric charge, depending on the makeup of the ion.

Cosmetologists are especially concerned with 2 types of ions: Hydrogen and hydroxyl (hydroxide). **Hydrogen ions** are positively (+) charged particles (one or a group
of atoms) of hydrogen. **Hydroxyl ions** are negatively (-) charged hydrogen ions that also have oxygen (hydroxyl radical). If a solution has more hydrogen ions than hydroxyl ions, it is an acid. If a solution has more hydroxyl ions than hydrogen ion, it is a base.

The term **pH** indicates the **concentration** (percentage) of hydrogen ions in a solution. This concentration determines if the solution has acidity (an acid) or alkalinity (a base). If a solution is the **same concentration** of hydrogen and hydroxyls are neutral because the acid and the base balance each other.

The pH scale (0-14) shows the degree of acidity or alkalinity of a solution or substance. The middle of the scale, 7 is the neutral point. The numbers 0 to 6.9 indicate acidity; 7.1 to 14 represent alkalinity.

Certain substances, such as litmus paper, and **indicators**, they have a certain color in the presence of an acid and a different color in the presence of a base. You can use them to find out if a solution is alkaline or acid. There are many other kinds of indicators available from dealers.

When acids and bases react, they form a **salt**, plus water. This reaction is called **neutralization**. Salts contain both a metal and a nonmetal because salts are formed by a combination of an acid and a base. Some salts also contain oxygen.

Acid and alkaline products affect the hair differently. **Acid products** shrink and harden the imbrications (scales) of the shaft of the hair. They also neutralize the alkalinity of hair products that have a pH over 7 (bases). Acid rinses, for example, are used to neutralize alkaline shampoos.

**Alkaline products** swell and soften the hair strand, opening the imbrications. Ammonia, for example, is an alkali that is used in permanent hair colors to open the imbrications of the hair so that the color molecules can pass into the inner layer of the hair. Alkaline products can neutralize acid products, but this is not a common application in cosmetology.

Skin and hair are acid. They have a pH of 4.5 to 5.5. Salon products that have a pH of 4/5 to 5.5 are said to be **acid-balanced in respect to skin and hair**. Thus, using an acid-balanced product does not change the natural pH of the skin or hair.
CHEMISTRY GLOSSARY

-A-

ACID – Sour tasting substance containing hydrogen and such substances as sodium potassium, nitrogen, or sulphur.

AIR – Mixture of gases, 78% nitrogen, 21% oxygen, and a small amount of carbon dioxide.

ALCOHOL – A clear liquid obtained by distillation from fermenting of sugar and fruits of grain. It consists of hydrogen, carbon, and oxygen.

ALKALI – A mixture of salts that neutralize acids.

AMMONIA – A colorless pungent gas consisting of nitrogen and hydrogen hastening agent.

ANALYSIS – Chemical separating of substances into component parts.

ATOM – Smallest unit of an element capable of existence.

ALUM – A mineral salt in Crystallize form valuable in cosmetics for its ability to constrict.

-B-

BASE – Bitter tasting substance formed of alkalies, the non-acid components of salts.

BICHLORIDE - Compound made of 2 or more atoms of chlorine with one or more basic atoms.

BORIC ACID – Mildly healing, antiseptic agent.

-C-

CARBON – An element common to all organic substances.

CHOLESTERIN – An extract of lanolin.

CHLORIDE – An elementary substance found in common salt.

COHESION – A force which operates in all liquids and bodies. Holds the elements together.
COMPOUND CHEMICAL – Union of two or more chemicals.

CONCENTRATED SOLUTION – Large amount of solute in proportion to solvent.

CRYSTALLIZATION – Solid separated from a liquid slowly by cooling a hot saturated solution. Results – Crystals of definite shape and luster.

CHEMICAL CHANGE – Permanently loses the identity of the matter and a new substance is formed.

DISTILLATION – Condensation of a liquid used for purification of wash etc.

DETERGENTS – Made generally with vegetable oils, strong cleaning powder, and leaves hair stripped of its natural oils. Makes scalp and hair dry.

DILUTE SOLUTION – One containing a small amount of dissolved material in proportion to solvents.

EMULSIONS – Permanent mixture of two or more substances united with a binding agent such as soap or gum.

ELEMENT – A simple substance incapable of being split into other elements.

GLYCERINE – A colorless sticky sweet fluid, obtained as a by product in the manufacturing of soaps.

GAS – Form of matter having neither shape nor volume.

HYDROGEN – A colorless, gaseous substance, when combined with oxygen it produces water. Lightest of all known substances. It is near free and is part of all acids.

HARD WATER – Contains minerals which will curdle soap instead of permitting a permanent lather to form.

INSOLUBLE – Cannot be dissolved
IODINE – By product of seaweed, soluble only in alcohol, compound known as tincture of iodine. Used as an antiseptic 2%.

INORGANIC CHEMISTRY – Branch of chemistry that treats of substances found in or on the earth, such as air and water.

LANOLIN – Purified wool fat, a wax taken from sheep’s wool.

LIQUID – A substance having volume, but no shape.

MATTER – Any substance having weight and occupying space.

MIXTURE – A combination of substances, maintaining their own identity and retaining its own properties.

MOLECULE – The smallest possible unit of existence of any substance, smallest particle of a compound.

NITROGEN – A colorless gaseous element, tasteless, odorless (present in the air and living tissue).

OINTMENT – Mixture of substance with a medicant to form a partially solid cream-like substance.

ORGANIC CHEMISTRY – Branch of chemistry that treats of carbons and its compounds which may be derived from the animal and vegetable kingdom

PETROLATUM – Salve-like substance derived from petroleum, used as basis for certain cosmetic products.

PRECIPITATION – Process of a substance being separated from a solution by action of a reagent.

PHYSICAL CHANGE – One in which the identity of the substance remains the same both before and after the change.
REACTION – Change in the identity and characteristics of the substance participating in the reaction. (Example – Cold wave)

REGENT – Any liquid in which a solute is not soluble. (Tincture of iodine).

SODIUM BENZOATE – A preservative used in cosmetics.

SODIUM CHLORIDE – Table salt

SODIUM CARBONATE of BICARBONATE-SODA

SODIUM HYDROXIDE – A strong alkali used in making of hard soap.

SYNTHESIS – A chemical reaction in which two or more substances combine to make a new product, such as manufacturing soap.

SUSPENSIONS – A mixture of insoluble powders in a liquid. Must be shaken before using.

SOLUTION – Process by which a substance is absorbed into a liquid. Preparation by dissolving a solid, liquid, or gaseous substance in another substance, usually a liquid.

SOLUTE – Substance dissolved in a fluid.

SOLVENT – An agent capable of dissolving substances. Liquid which dissolves and holds solute producing a solution.

SATURATED SOLUTION – A solution that contains all the solute it can dissolve.

SOAP – Made by the process of Asponification of blending of a fat or fatty acid with an alkali.

SULFURIC ACID – A heavy corrosive, oily, poisonous acid. Used in the making of sulfonated oil shampoos.

SALTS – Formed by the addition of acids, to the base.

VALENces – Small letters of figures places at the base of the symbol or chemical term to designate the amount used in proportion to other elements.

VISCOUS – Sticky, glue-like.

VOLATILE – To evaporate quickly.

WITCH HAZEL – Solution of alcohol and water containing the astringent agent extracted from witch hazel bark.

ZINC OXIDE – White powder obtained by burning zinc carbonate. Used in making cosmetics. Insoluble in water.