

## CLOUDS

Clouds are an important part of the earth's weather and climate. Clouds form when water condenses in the sky. Clouds are visible accumulations of tiny water droplets or ice crystals in the Earth's atmosphere.

### Cloud formation:

Clouds form from water in the sky. The water may evaporate from the ground or move from other areas. Water vapour may be invisible but it is always in the sky in some amount. Clouds form when an area of air becomes cooler until the water vapour there condenses to liquid form. The water will condense around dust, ice or sea salt.

### Importance of clouds:

They are needed for rains or snow.

1. During the nights, clouds reflect heat back to the earth and keep the temperature warm.
2. During the day, clouds help in keeping the temperature cooler by shielding the sunlight.
3. Researching and studying clouds helps in understanding weather and climate.

### Factors determining the type of clouds:

1. Temperature
2. Wind

### Basis on which clouds are classified:

Clouds are classified on the basis of 2 major factors.

1. Physical Form
2. Height at which Clouds are formed

### Classifications of clouds on the basis of their physical forms:

According to their altitude, stretch, density, and transparency or opaqueness clouds are classified into four types which are given below.

1. Cirrus
2. Cumulus
3. Stratus
4. Nimbus

### Cirrus Clouds:

1. Cirrus clouds are formed at high altitudes of 8,000 M – 12,000 M.
2. They are detached thin clouds.
3. They have a feathery appearance.
4. They are always white in colour.

### Cumulus Clouds:

1. Cumulus clouds are generally formed at a height of 4,000 M – 7,000 M.
2. They look like cotton wool.
3. They exist in patches and can be seen dispersed here and there.
4. They have a flat base.

#### Stratus Clouds:

1. Stratus clouds are horizontal.
2. Stratus clouds are stratified or layered clouds cover big portions of the sky.
3. These clouds are usually formed due to the mixing of air masses with various temperatures or due to loss of heat.
4. The presence of stratus clouds means chilly, overcast day.

#### Nimbus Clouds:

1. Nimbus clouds are usually formed at lower altitudes.
2. The colour of Nimbus clouds is usually black or dark grey.
3. Nimbus clouds block the sunlight
4. These types of clouds usually cause heavy rainfall and thunderstorms.

#### Clouds that bring rainfall or snowfall:

Clouds with the prefix “nimbo” or the suffix “nimbus” bring rainfall and snowfall. Nimbostratus clouds bring continuous rainfall or snowfall that may continue for a very duration.

Cumulonimbus clouds are also called thunderheads. Thunderheads produce rain, thunder and lightning.

#### Classification based on the altitude of Clouds formation:

Clouds are classified on the basis of their formation at different heights. The altitude at which certain category of clouds form varies on the basis of the polar region, tropical region etc.

Below table gives the classification of clouds and the associated types of clouds

Classification of clouds	Types of clouds
High clouds	<ol style="list-style-type: none"><li>1. Cirrus</li><li>2. Cirrostratus</li><li>3. Cirrocumulus</li></ol>
Middle clouds	<ol style="list-style-type: none"><li>1. Altostratus</li><li>2. Altocumulus</li></ol>
Low clouds	<ol style="list-style-type: none"><li>1. Stratocumulus</li><li>2. Nimbostratus</li></ol>

Clouds with extensive vertical development	<ol style="list-style-type: none"> <li>1. Cumulus</li> <li>2. Cumulonimbus</li> </ol>
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#### High-Level Clouds:

1. Polar Regions – they form at altitudes of 3000 m (10,000 ft) to 7600 m (25,000 ft).
2. Temperate Regions – they form at altitudes of 5000 m (16,500 ft) to 12,200 m (40,000 ft).
3. Tropical Regions – they form at altitudes of 6,100 m (20,000 ft) to 18,300 m (60,000 ft).

#### Mid-Level Cloud:

1. Non-vertical clouds in the middle level are prefixed by the alto.
2. At any latitude, these clouds are formed as low as 2000 m (6500 ft) above the surface.
3. These clouds can be formed as high as 4,000 m (13,000 ft) near the poles
4. These clouds are formed at an altitude of 7,600 m (25,000 ft) in the tropical region.

#### Low-level Clouds:

1. These clouds are formed near the surface up to 2000 m (6500 ft).
2. These types of clouds have no prefix.

#### Nephology:

Nephology is the science of clouds, which is undertaken in the cloud physics branch of meteorology.

#### Method used by meteorologist to measure the cloud cover:

1. Oktas is the measurement unit that is used to measure the amount of visible sky that is covered by clouds.
2. An okta estimates how many eighths of the sky is covered in clouds.
3. Clear sky is measured as 0 oktas.
4. An overcast or grey sky is measured as 8 oktas.

Multiple choice questions:

1. A stratus cloud which forms near ground is called the
  - (a) Smoke
  - (b) Fog
  - (c) Smog
  - (d) Vapors
2. Clouds made of ice crystals are the
  - (a) Stratus
  - (b) Cirrus
  - (c) Cumulus
  - (d) Nimbus
3. Prefix use for low clouds is
  - (a) Alto
  - (b) Cirro
  - (c) Nimbo
  - (d) None
4. Clouds which resemble cotton balls are the
  - (a) Stratus
  - (b) Cirrus
  - (c) Cumulus
  - (d) Nimbus
5. Collection of water droplets which are suspended in air are called
  - (a) Wind
  - (b) Cloud
  - (c) Gases
  - (d) Sleet
6. These clouds are probably composed of ice crystals and dust from meteor smoke, and they occur at altitudes of 82 km (50 miles).
  - (a) Stratocumulus clouds
  - (b) Noctilucent clouds
  - (c) Cumulonimbus clouds
  - (d) Cirrus clouds
7. Which statement is true about orographic clouds?

They form near the ground during the coolest parts of the day.

  - (a) They are formed by the ascent of air over hills and mountains
  - (b) They are the puffy clouds associated with pleasant weather and sunny skies.
  - (c) They are formed by convection and rising air, especially during hot humid weather.
  - (d) None of these
8. The clouds associated with thunderstorms are called...
  - (a) Cumulus clouds
  - (b) Cumulonimbus clouds
  - (c) Stratus clouds
  - (d) Cirrus clouds

9. Which statement regarding cloud formation is true?

- (a) Clouds are formed when cool dry air rises.
- (b) Clouds are formed when hot dry air descends.
- (c) Clouds are formed when hot dry air rises.
- (d) Clouds form when relatively moist air rises

10. What prefix is often used in names of types of high clouds, which are found at mean heights above the ground of 5 to 13 km (16,500 to 42,500 feet)?

- (a) Strato- (for stratus clouds)
- (b) Nimbo- (for nimbus clouds)
- (c) Cirro- (for cirrus clouds)
- (d) Cumulo- (for cumulus clouds)

11. What general type of cloud is typically associated with longer periods of rain rather than brief but intense showers and thunderstorms?

- (a) Cirrus
- (b) Cumulus
- (c) Nimbus
- (d) Stratus

12. What is the formal name for “mother-of-pearl” clouds, which often appear in brilliant iridescent colors?

- (a) Stratocumulus clouds
- (b) Nacreous clouds
- (c) Noctilucent clouds
- (d) Orographic clouds

13. Which one of the following statements is correct?

- (a) Cirrus clouds are composed of ice crystals.
- (b) Cirrus clouds exhibit a flat base and have the appearance of rising domes.
- (c) Cumulus clouds are white and thin and form delicate patches and give a fibrous and feathery appearance.
- (d) Cumulus clouds are classified as high clouds.

14. Consider the following statements:

1. The axis of the earth's magnetic field is inclined at  $23\frac{1}{2}$  degree to the geographic axis of the earth.
2. The earth's magnetic pole in the northern hemisphere is located on a peninsula in northern Canada.
3. Earth's magnetic equator passes through Thumba in South India.

Which of the statements given above is/are correct?

- (a) 1, 2 and 3
- (b) 2 and 3
- (c) 2 only
- (d) 3 only

15. Consider the following statements:

1. Either of the two belts over the oceans at about 30 – 35 degrees North and South latitudes is known as Horse latitude.

2. Horse latitudes are low pressure belts.

Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

16. Consider the following statements:

1. The annual range of temperature is greater in the Pacific Ocean than that in the Atlantic Ocean.

2. The annual range of temperature is greater in the Northern Hemisphere than that in the Southern Hemisphere.

Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

17. The clouds float in the atmosphere because of their low:

- (a) Velocity
- (b) Temperature
- (c) Density
- (d) Pressure

18. Consider the following statements and choose the statement which is/are correct?

1. Air pressure at sea level is lower than at the mountain top.

2. Air pressure decreases when air descends.

Which of the statements given above is/are correct?

- (a) Only 1
- (b) only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

19. Which of the following affects atmospheric pressure?

- (a) Temperature
- (b) Earth rotation
- (c) Altitude
- (d) All the above

20. Consider the following statements and choose the statement which is/are correct?

1. The process by which two air masses of different physical characteristics are brought together

is frontolysis.

2. The gradual dissipation of the frontal zone is called frontogenesis.

Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2.
- (d) Neither 1 nor 2

21. Which of the following statements are correct about temperate cyclones?

1. They have a low pressure gradient than tropical cyclones
2. They travel from east to west
3. They are generally produced in summers

Which of the statements given above is/are correct?

Codes:

- (a) Only 1
- (b) Only 2
- (c) Only 1 and 3
- (d) All of these

22. Laterisation of soil is related to which type of vegetation?

- (a) Tropical evergreen
- (b) Tropical monsoon
- (c) Temperate evergreen
- (d) Mediterranean forest

20. These are high clouds that are composed of ice crystals:

- (a) Cumulus
- (b) Nimbostratus
- (c) Altocumulus
- (d) Cirrus

21. A wall cloud is an example of a(n):

- (a) Accessory cloud
- (b) Upper level cloud
- (c) Cirrus
- (d) Lenticular

22. Clouds that develop due to convective uplift are termed:

- (a) Stratiform clouds
- (b) Noctilucent clouds
- (c) Cumulus clouds
- (d) Fair weather

23. Which of the following is a cloud on the ground?:

- (a) Funnel cloud
- (b) Fog
- (c) Wall cloud
- (d) Shelf cloud

24. All the following are cirrus type clouds except:

- (a) Mackerel sky
- (b) Mare's tails
- (c) Anvil
- (d) Fractus

25. Precipitation generated from dynamic lifting and not convective lifting will fall from a \_\_\_\_\_ clouds.

- (a) Nimbostratus
- (b) Cumulonimbus
- (c) Alto cumulus
- (d) Cirrus

26. The prefix "alto" means:

- (a) Upper
- (b) Middle
- (c) Lower
- (d) None of them

27. The two ingredients needed to form clouds aloft are:

- (a) Instability and lifting
- (b) Lifting and saturated air
- (c) Wind shear and Lifting
- (d) Air with a high dewpoint and instability

28. Which clouds occurs at the highest altitude:

- (a) Altostratus
- (b) Cirrostratus
- (c) Stratocumulus
- (d) Noctilucent

29. The term stratus means:

- (a) Vertically developed
- (b) Upper level
- (c) Horizontally layered
- (d) Low level

30. Cloud droplets can remain liquid even when they have a temperature of below freezing.

- a. True
- b. False

31. A mid-latitude cyclone will often have a \_\_\_\_\_ shape on satellite imagery.

- (a) Rectangular
- (b) Dumbbell
- (c) Comma
- (d) Pentagon

32. These are cirrocumulus that look like fish scales.

- (a) Lenticular
- (b) Mackerel Sky
- (c) Mare's tails
- (d) Uncinus

33. A ring around the sun or moon will show when they shine through this cloud:

- (a) Nimbostratus
- (b) Altocumulus
- (c) Fair weather cumulus
- (d) Cirrostratus

34. The most fair weathered and smallest of the cumulus clouds is the:

- (a) Cumulus congestus
- (b) Cumulonimbus
- (c) Cumulus humilis
- (d) None of these

35. Fog formed by cooling of the earth's surface at night is:

- (a) Radiation fog



- (b) Advection fog
  - (c) Steam fog
  - (d) Frontal fog
36. Precipitation that vaporizes before making it to the earth's surface is:
- (a) Fog
  - (b) Virga
  - (c) Cloud droplets
  - (d) Haze
37. The clouds produced behind aircraft exhaust that is often visible high aloft are called contrails.
- (a) True
  - (b) False
38. The height of stratus cloud bases tends to lower as a warm front approaches.
- (a) True
  - (b) False
39. This is the visible portion of a tornadic circulation produced by condensation of rapidly rotating rising air.
- (a) Hook echo
  - (b) Mammatus
  - (c) Funnel cloud
  - (d) Wall cloud
40. High-altitude, wispy clouds composed of ice crystals may precede a cold front. What type of clouds are these?
- (a) Cumulus
  - (b) Stratocumulus
  - (c) Cirrus
  - (d) Altocumulus
41. Puffy white clouds in lines or groups at middle altitudes in the sky are what type of clouds?
- (a) Stratus
  - (b) Cirrostratus
  - (c) Cirrus
  - (d) Altocumulus
42. Low rainclouds that form layers or sheets covering the whole sky are what type of clouds?
- (a) Nimbostratus
  - (b) Altocumulus
  - (c) Stratus
  - (d) Cumulonimbus

43. Thunderheads, rising to great heights and accompanied by thunder and lightning, are what type of clouds?

- (a) Cumulus
- (b) Nimbostratus
- (c) Stratocumulus
- (d) Cumulonimbus

44. If a parcel of air rises, and the amount of water vapor in the air does not change, what will most likely happen to the relative humidity?

- (a) Increase
- (b) Decrease
- (c) Remain the same
- (d) None of these

45. Rainfall caused by air rising up the slopes of mountains is what type of rainfall?

- (a) Orographic
- (b) Convectional
- (c) Conductional
- (d) Cyclonic

46. Worldwide, where would you expect the least amount of precipitation?

- (a) Along the equator in the Inter-tropical Convergence Zone
- (b) On the west coasts of continents at about 50 degrees north and south
- (c) In the subtropics at about 30 degrees north and south
- (d) On the east coasts of continents at about 40 degrees north and south

47. Which fact is true about Cirrus clouds?

- (a) They look like fluffy tufts of cotton floating in the sky
- (b) They are the white streaks left behind by airplanes
- (c) They are low and colored gray or white
- (d) It is small and is found very high in the sky

48. Which statement is true about how clouds are formed?

- (a) Clouds form on the ground and they just rise because of strong winds
- (b) Tiny droplets of water in the air rise with warm air and they get cooler upon rising.
- (c) Clouds are packets of air formed in the atmosphere and water blended with the air
- (d) Clouds are mass of cotton balls that flew in the air

49. How many are the common types of clouds?

- (a) There are only 2 types of clouds
- (b) There are 8 types of clouds
- (c) There are too many to count
- (d) There are 15 types of clouds

50. What are clouds made up off?

- (a) Nitrogen and oxygen
- (b) Helium
- (c) Microscopic gas bubbles
- (d) None of these