Q1) A force of 10 N causes a mass *m* to accelerate at the rate of 8 m/s^2. The same force causes mass *m'* to accelerate at the rate of 30 m/s^2. If the two masses are tied together and the same force is applied, then what will be the rate of acceleration of the system of masses?

Solution:

For mass, *m*

Force, *F* = 10 N

Acceleration, *a* = 8 m/s^2

Mass = *m*

Now,

F = *m* × *a*

10 = *m* × 8

$$m = \frac{10}{8} \text{ kg}$$
= 1.25 kg

∴ Mass, *m* = 1.25 kg

For mass, *m'*

Force, *F* = 10 N

Mass = *m'*

Acceleration, *a* = 30 m/s^2

Now,

F = *m'* × 30

10 = *m'* × 30

$$m' = \frac{10}{30} \text{ kg}$$
= 0.33 kg

∴ Mass, *m'* = 0.33 kg

For the mass system, (*m* + *m'*)

Force, *F* = 10 N

Total mass = $m + m'$

= 1.25 + 0.33 kg

= 1.58 kg

Acceleration, a = ?

On putting these values in the relation $F = m \times a$, we get

10 = 1.58 × a

$$a = \frac{10}{1.58}$$

Or, $a = 6.33$ m/s^2

Therefore, the force of 10 N will produce 6.33 m/s^2 acceleration if the masses m and m' are tied together

Q2) State the points of difference between the two broader classes of plant tissues.

Solution:

	Meristematic tissue		Permanent tissue
i.	The cells constituting this tissue divide repeatedly.	i.	The cells constituting this tissue are derived from the meristematic tissues that have lost their ability to divide.
ii.	The constituting cells are undifferentiated.	ii	The constituting cells are differentiated to perform specific functions in the plant.
iii	The constituting cells lack intercellular spaces and vacuoles.	iii	Intercellular spaces and vacuoles are present in the constituting cells.
iv	The constituting cells are always living.	iv	The constituting cells may be either living or dead.

Q3) Draw the structure of a typical plant cell and label its parts. Write the functions of the components absent from an animal cell.

Solution:
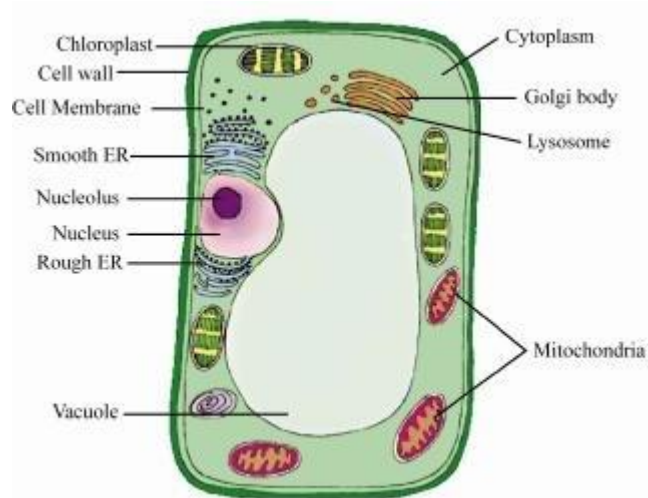
The organelles absent from animal cells are cell wall and plastids.

Cell wall − It is the outermost structure present in a plant cell. It is present outside the plasma membrane.

It is rigid, protective, non-living and freely permeable. It is composed of cellulose.

Main functions:

(i) Provides structural strength to a plant cell

(ii) Prevents the bursting of a plant cell in hypotonic medium

(iii) Gives a definite shape to the cell

Plastids − These are double-membrane organelles having two distinct regions − grana and stroma. Plastids are of two types: chromoplasts and leucoplasts.

Main functions of chromoplasts:

(i) These are the pigmented plastids which impart colour to the plant parts.

(ii) The chromoplast having the pigment chlorophyll is called chloroplast. Chloroplast is the site for photosynthesis.

Main functions of leucoplasts:

In leucoplasts, materials such as starch, oils and protein granules are stored.

Q4) Which of the following cell organelles is present in an onion peel, but **not** in human cheek cells ?

A) Nucleus

B) Cell wall

C) Cytoplasm

D) Cell membrane

Answer:

B

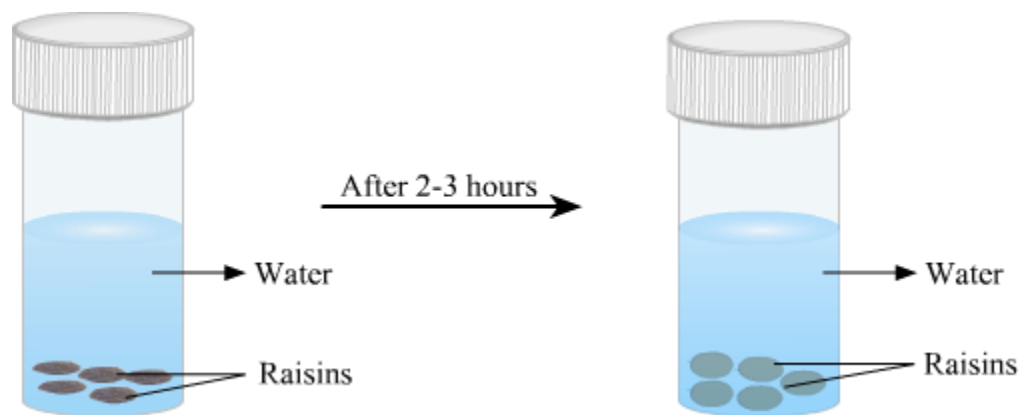**Solution:**

Cell wall is present in an onion peel as it is a plant cell. However, it is absent in human cheek cells.

Hence, the correct option is B.

Q5) Consider the given experimental set-up.

Which phenomenon is observed in the given experiment?

A) Endosmosis

B) Plasmolysis

C) Exosmosis

D) Diffusion

Answer:

A

Solution:

It is clear in the given experiment that swelling of raisins occurred after 2−3 hours. This happened because the concentration of sugar solution inside the raisins was more than that of the water. Thus, the water moved inside the raisins, which resulted in the swelling of the raisins. This phenomenon is known

as endosmosis.

Hence, the correct option is A.

Q6) Rohan placed a wooden block A on a horizontal surface. He used a spring balance and measured the force F_1 required to just move the body A. Then, he placed two other blocks, B and C, one by one over it and found the new forces to be F_2 and F_3, respectively. The relation between F_1, F_2 and F_3 is

A) $F_1 < F_2 < F_3$

B) $F_2 < F_1 < F_3$

C) $F_3 < F_2 < F_1$

D) $F_3 < F_1 < F_2$

Answer:

A

Solution:

Friction force increases with an increase in the weight of the object moving on the given surface. When the wooden blocks B and C are placed over block A, the net weight of the block increases. As a result, the force of friction also increases. Therefore, larger force is required to pull the block.

Hence, the correct option A.

Q7) The components of which of the following solutions can be separated by the process of filtration?

A) Copper sulphate in water

B) Chalk powder in water

C) Starch in water

D) Sugar in water

Answer:

B

Solution:

Only the components of a suspension can be separated by the process of filtration. Among the given solutions, chalk powder in water is an example of a suspension.

Hence, the correct option is B.
Q8) Consider the given substances.

I: Sugar
II: Camphor
III: Common salt
IV: Ammonium chloride

Which of the given pair of substances can be separated from its respective mixture by the process of sublimation?

    A) **I** and **II**

    B) **II** and **IV**

    C) **II** and **III**

    D) **III** and **IV**

Answer:

B

Solution:

Among the given substances, camphor and ammonium chloride have the tendency to sublimate. Thus, they can be separated from their respective mixture by the process of sublimation.

Hence, the correct option is B.

Q9) A mixture of chalk powder, powdered glass and sugar is dissolved in water and then filtered. Which of the following substances is obtained as a residue on the filter paper?

  A) Sugar and chalk powder

  B) Sugar and powdered glass

  C) Chalk powder and powdered glass

  D) Sugar, chalk powder and powdered glass

Answer:

C

Solution:

During filtration, the insoluble substances are left as a residue on the filter paper. When a mixture of chalk powder, powdered glass and sugar is dissolved in water, only sugar gets dissolved in water.
Thus, the substances left on the filter paper are chalk powder and powdered glass.

Hence, the correct option is C.

Q10) Which of the following is a true solution?

I: Sugar in water
II: Sand in water
III: Egg albumin in water
IV Chalk powder in water

A) **I**

B) **II**

C) **III**

D) **IV**

Answer:

A

Solution:

A true solution is clear and transparent. Thus, sugar in water is a true solution as it is clear and transparent.

Hence, the correct option is A.

Q10) Consider the chemical experiments given below.

I. Zinc granules are added to dilute sulphuric acid in a test tube.
II. Sulphur powder is added to dilute hydrochloric acid in a test tube.
III. Sodium sulphate is added to barium chloride solution in a test tube.
IV. Potassium chloride is added to barium sulphate solution in a test tube.

Which of the following chemical experiments depicts a double displacement reaction?

A) **I**

B) **II**

C) **III**

D) **IV**

Answer:

C

Solution:

Among the given options, adding of sodium sulphate to barium chloride solution is an example of a double displacement reaction.

Hence, the correct option is C.
Q12)

Which of the following is **not** an Indian organisation that works to prevent food adulteration?

   A) ISI

   B) FAO

   C) FPO

   D) Agmark

Answer:

B

Solution:

Food and Agriculture Organisation (FAO) is an agency of the United Nations that works for maintaining food security and nutrition in all countries. It is not an Indian organisation.

Hence, the correct option is B.

Q13) A student dissolved a mixture of iron filings and sulphur powder in a carbon disulphide solvent. The solution shown in which of the following figures illustrates the appearance of the resulting solution?

A

Iron filings

Sulphur
powder

B)

Clear
solution

C)

Iron filings +
sulphur powder

D)
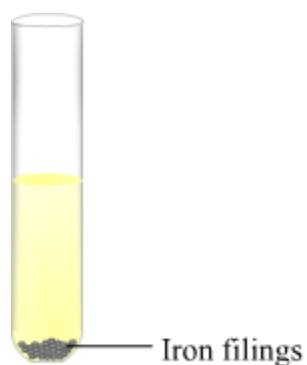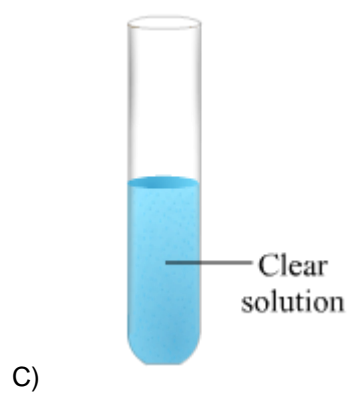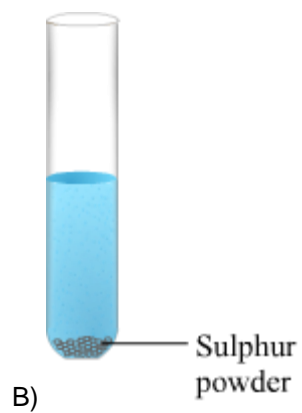
Answer:

A

Solution:

When a mixture of iron filings and sulphur powder is dissolved in a carbon disulphide solvent, only sulphur gets dissolved, giving rise to a yellow solution. While the iron fillings settle at the bottom, the remaining stays undissolved.

Hence, the correct option is A.

Q14) A student took a mixture of iron filings and sulphur powder in a china dish in a chemistry laboratory. Then, he added some iron sulphide to it and rolled a bar magnet over the china dish.

Which of the following substances got attracted to the magnet?

   A) Only iron filings

   B) Only iron sulphide

   C) Iron filings and sulphur

   D) Iron filings and iron sulphide

Answer:

A

Solution:

In a mixture of iron filings, sulphur powder and iron sulphide, only iron filings would get attracted to a magnet.

Hence, the correct option is A.

Q15) A student performed an experiment to find out the relation between the weight of a rectangular block lying on a horizontal table and the minimum force required to move it using a spring balance. Which of the following analogies regarding the experiment is correct?

  A) More force is required to move an object having greater inertia.

  B) Less force is required to move an object having greater inertia.

  C) More force is required to move an object having lesser inertia.

  D) Force is independent of inertia.

Answer:

A

Solution:

The frictional force increases with an increase in the weight of the object sliding on a given surface. Since weight of an object is directly proportional to the inertia of the object, greater force is required to move an object having greater inertia.

Hence, the correct option is A.

Q16) A student has to perform an experiment to establish the relation between the weight of a wooden block lying on a horizontal surface and the minimum force required to just move it using the spring balance. Which of the following set-ups should he choose apart from a wood mica and a sand paper to perform the experiment?

   A) Wooden blocks, spring balance, glass top, string, newspaper

   B) Wooden block with hook, spring balance, weight blocks, string

   C) Wooden blocks, string, spring balance, weight blocks, glass top

   D) Wooden blocks with hook, weight blocks, string, spring balance,

Answer:

B

Solution:

Since the student already has two surfaces to perform the experiment, he would only need a wooden block with a hook, a spring balance, some weight blocks and a string to conduct the experiment.

Hence, the correct option is B.

Q17) What is the S.I. unit of friction?

  A) Joule

  B) Newton

  C) Joule-metre

  D) Newton-metre

Answer:

B

Solution:

Friction is a type of force and its S.I. unit is Newton.

Hence, the correct option is B.

Q18) The friction that acts on bodies when they are just at the verge of moving over the surface of another body is called

   A) static friction

B) sliding friction

C) rolling friction

D) limiting friction

Answer:

D

Solution:

Limiting friction is the friction that comes into play when the motion is not started, but is about to start, i.e. the body is at the verge to move.

Hence, the correct option is D.

Q18) When a wooden block is made to move on a table by applying a constant force, the friction acting between the two is called

A) static friction

B) sliding friction

C) rolling friction

D) limiting friction

Answer:

B

Solution:

When a wooden block moves on a the table, it overcomes the static and limiting frictions. Therefore, the friction that acts on the block is called sliding friction.

Hence, the correct option is B.

Q19) A student used a wooden block of mass 30 kg in an experiment to establish the relation between the weight of a rectangular block and the minimum force required to move it. He placed the block on a table and attached a spring balance to it and tried to pull it in the horizontal direction. When the block was just about to move, the reading on the spring balance was 20 kgf.
What is the value of the limiting friction in this case?

A) 20 kgf

B) 30 kgf

C) 200 kgf

D) 300 kgf

Answer:

A

Solution:

Limiting friction is equal to the applied force when the object is just about to move as a horizontal force is applied to it. Therefore, in the given case, limiting friction is equal to 20 kgf.

Hence, the correct option is A.