

Holiday Homework

1. MCA

Q1. Which of the following statements are true for pure substances?

(i) Pure substances contain only one kind of particles.

(ii) Pure substances may be compounds or mixtures.

(iii) Pure substances have the same composition throughout.

(iv) Pure substances can be exemplified by all elements other than nickel.

Ans (i) and (ii)

Q2. Rustling of an article made up of iron is called.

Ans Corrosion and it is a chemical change.

Q3. A mixture of sulphur and carbon disulphide is

Ans heterogeneous and does not show Tyndall effect.

Q4. Tincture of iodine has antiseptic properties. This solution is made by dissolving.

Ans (d) iodine in alcohol

Q5. Which of the following are homogeneous in nature? (i) ice (ii) wood (iii) soil (iv) air

Ans (d) (iii) and (iv)

Q6. Which of the following are physical changes?

(i) Melting of iron metal

(ii) Rusting of iron

(iii) Bending of iron rod

(iv) Drawing a wire of iron metal.

Ans (c) (i), (iii) and (iv)

Q7. Dec. Which of the following are chemical changes

(i) Decaying of wood.

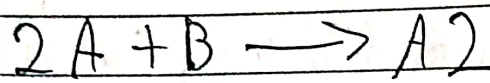
(iv) Hammering of a nail into a piece of wood

(ii) Sawing of wood

(iii) Burning of wood

Ans Decaying of Wood and Burning of wood

Q 8. Two substances A and B were made to react to form a third substance, A₂B according to the following reaction:

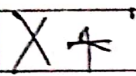
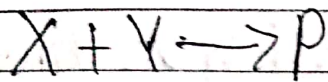


Which of the following statements concerning this reaction are incorrect?

- (i) The product A₂B shows the properties of substances A and B.
- (ii) The product will always have a fixed composition.
- (iii) The product so formed cannot be classified as a compound.
- (iv) The product so formed is an element.

Ans (i), (ii) and (iii)

Q9. Two chemical species X and Y combine together to form a product P which contains both X and Y.



Ans (i), (ii) and (iii)

Q10. Suggest separation technique's one would need to employ to separate the following mixtures.

Ans (d) Kerosene oil, water and salt.

Q11. Salt can be recovered from its solution by evaporation. Suggest some other technique for the same?

Ans Salt can also be recovered by crystallisation which gives purer crystals than evaporation.

Q12. The 'sea-water' can be classified as a homogeneous

as well as heterogeneous mixture explain?

Ans Sea-water is homogeneous because salts are completely dissolved, but it can be heterogeneous due to floating impurities or marine life.

Q13. While diluting a solution of salt in water a student by mistake added acetone

(boiling point 56°C) What technique can be employed to get back the acetone.

Justify your choice.

Ans Distillation can be used because acetone has a lower boiling point than water, so it will evaporate and can be collected first.

Q14. What would you observe when

(a) a saturated solution of potassium chloride prepared at 60°C is allowed to cool to

room temperature.

Ans Crystals of potassium chloride will form as the solubility decreases when the temperature drops.

(b) an aqueous sugar solution is heated to dryness.

Ans A black residue will be left as sugar.

decomposes on strong heating instead of forming crystals.

(c) a mixture of iron fillings and sulfur powder is heated strongly.

Ans A black solid (iron sulphide) is formed showing a chemical reaction between iron and sulfur.

Q15. Explain why particles of a colloidal solution do not settle down when left undisturbed while in the case of a suspension they do.

Ans Colloidal particles do not settle down because they are very small and kept in motion by Brownian movement which prevents settling. In suspensions the particles are large and heavier so they settle due to gravity.

Q16. An object is dropped from rest at a height of 150 m and simultaneously another object is dropped from rest at a height 100 m. What is the difference in their heights after 2 s if both the objects drop with same acceleration how does the difference in heights vary with time.

Ans $s = \frac{1}{2}gt^2$

$g = 9.8 \text{ m/s}^2, t = 2 \text{ s}$

Distance fallen after 2 s $= \frac{1}{2} \times 9.8 \times 2^2 = 19.6 \text{ m}$

First object: $150 - 19.6 = 130.4 \text{ m}$

Second object: $100 - 19.6 = 80.4 \text{ m}$

Difference = $130.4 - 80.4 = 50 \text{ m}$

See the difference in height remains constant at 50 m throughout the fall if they start with same acceleration and time.

Q17. An object starting from rest travels 20 m in first 2 s and 160 m in next 4 s . What will be the velocity after 7 s from the start.

Ans $u = 0$ $v = u + at = 0 + 10 \times 7$

distance = 20 m $= 70 \text{ m/s}$ Ans

$T = 2 \text{ s}$

$$\Rightarrow S = ut + \frac{1}{2}at^2$$

$$\Rightarrow 20 = 0 + \frac{1}{2}a(2)^2$$

$$\Rightarrow a = 10 \text{ m/s} \text{ Ans}$$

Q18. An electron moving with a velocity of $5 \times 10^4 \text{ ms}^{-1}$ enters into a uniform electric field and acquires a uniform acceleration of 10^4 ms^{-2} in the direction of its initial motion.

(i) Calculate the time in which the electron would require a velocity double of its initial velocity.

Ans $u = 5 \times 10^4 \text{ m/s}$

$v = 2u = 10^5 \text{ m/s}$

$a = 10^4 \text{ m/s}^2$

$v = u + at \Rightarrow 10^5 = 5 \times 10^4 + 10^4 \times t$

$\Rightarrow \frac{5 \times 10^4}{10^4} = 5 \text{ sec} \text{ Ans}$

(ii) How much distance would the electron cover in this time?

$$s = ut + \frac{1}{2}at^2$$

$$s = (5 \times 10^4)(5) + \frac{1}{2}(10^4)(5)^2$$

$$= 2.5 \times 10^5 + 1.25 \times 10^5 = 3.75 \times 10^5 \text{ m.}$$

$$= 3.75 \times 10^5 \text{ m} \text{ Ans}$$

Q19. Obtain a relation for the distance travelled by an object moving with uniform acceleration in the interval between n th and S th seconds.

Ans $S_n = u + \frac{a}{2}(2n-1)$

n th Second

$$= S_4 = u + \frac{a}{2}(2 \times 4 - 1) = u + \frac{a}{2}(7)$$

S th Second

$$= S_5 = u + \frac{a}{2}(2 \times 5 - 1) = u + \frac{a}{2}(9)$$

$$S_5 = u + \frac{a}{2}(9) \text{ Ans}$$

Q20. An auto travels at a rate of 25 km/hr for 4 minutes then 50 km/hr for 8 minutes - finally at 20 km/hr for 2 minutes. Find the distance travelled in km and the average speed for the complete trip in m/s.

Ans

$$25 \text{ km/hr} = \frac{25}{60} = 0.4167 \text{ km/min}$$

$$50 \text{ km/hr} = \frac{50}{60} = 0.8333 \text{ km/min}$$

$$20 \text{ km/hr} = \frac{20}{60} = 0.3333 \text{ km/min}$$

First part

$$0.4167 \times 4 = 1.667 \text{ km}$$

Second part

$$0.8333 \times 8 = 6.666 \text{ km}$$

Third part

$$0.3333 \times 2 = 0.6667 \text{ km}$$

Total distance =

$$1.667 + 6.666 + 0.6667 = 9 \text{ km}$$

$$\text{Total time} = \frac{14}{60} \text{ hours}$$

$$\text{Avg Speed} = \frac{9}{14/60} = \frac{9 \times 60}{14} = 38.57 \text{ km/h}$$