Sample Paper

ANSWER KEYS

1	(b)	7	(d)	13	(a)	19	(b)	25	(c)	31	(b)	37	(d)	43	(c)	49	(c)	55	(b)
2	(a)	8	(d)	14	(b)	20	(a)	26	(d)	32	(d)	38	(a)	44	(a)	50	(c)	56	(d)
3	(a)	9	(b)	15	(b)	21	(c)	27	(c)	33	(a)	39	(a)	45	(d)	51	(a)	57	(b)
4	(b)	10	(b)	16	(c)	22	(a)	28	(a)	34	(a)	40	(a)	46	(a)	52	(d)	58	(c)
5	(c)	11	(a)	17	(a)	23	(a)	29	(a)	35	(d)	41	(d)	47	(c)	53	(c)	59	(a)
6	(c)	12	(d)	18	(b)	24	(d)	30	(d)	36	(c)	42	(c)	48	(d)	54	(c)	60	(d)

SOLUTIONS

1. **(b)** $\underset{(A)}{HCl} + \underset{(B)}{Na_2CO_3} \longrightarrow \underset{(C)}{NaCl(aq)} + \underset{(D)}{CO_2 + H_2O}$

   $CO_2 + NH_3 + NaCl(aq) \longrightarrow \underset{\text{Baking soda}}{NaHCO_3} + NH_4Cl$
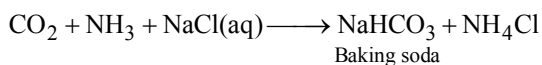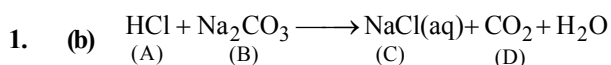
   Hence A & B are HCl and Na_2CO_3

2. **(a)** Element X can react with both acid and base. It shows that element X is amphoteric in nature and is an electropositive element.

3. **(a)** $Zn + 2\,HCl \longrightarrow ZnCl_2 + H_2$

   $Na_2CO_3 + 2\,HCl \longrightarrow 2NaCl + H_2O + CO_2$

   $Zn + 2\,NaOH + 2H_2O \longrightarrow Na_2[Zn(OH)_4] + H_2$
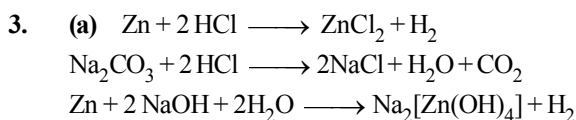
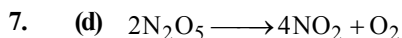4. **(b)** $x \to (s)$; $y \to (aq)$

5. **(c)** Gold is least reactive hence does not corrode at all.

6. **(c)** Atomic number of element 'X' (Z = 12) suggests it Mg and atomic number of Element 'Y' (Z = 17) is Cl.

   $\underset{(X)}{Mg} + \underset{(Y)}{Cl_2} \longrightarrow \underset{(Z)}{MgCl_2}$
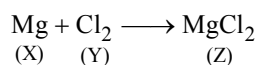
   Molucular formula of Z is XY_2.
   Compound 'Z' is ionic compound, hence it would conduct electricity in molten state.

7. **(d)** $2N_2O_5 \longrightarrow 4NO_2 + O_2$

8. **(d)**

9. **(b)** Gold dissolves in Conc. HCl and Conc. HNO_3 3 : 1 mixture (aqua regia)

10. **(b)** Both are redox reactions. Redox reactions are characterised by the transfer of electrons between chemical species. One species undergoes oxidation while another species undergoes reduction.

11. **(a)**   12. **(d)**   13. **(a)** 14. **(b)**   15. **(b)**

16. **(c)** $(A) \to (p), (B) \to (q), (C) \to (r), (D) \to (s)$

17. **(a)**

18. **(b)** If light rays strikes the inside face at an angle > 42°, glass prism behaves like a perfect mirror.

19. **(b)**

20. **(a)**

21. **(c)** A convex lens will produce a diminished, real and inverted image between F and 2F if the object is placed at 2F.

22. **(a)** Absolute refractive index of a medium = speed of light in vacuum/speed of light in the medium.

23. **(a)** Focus of a concave mirror is towards the left, so focal length is negative.

24. **(d)** Air bubble in water act like a concave lens.

25. **(c)** Aqueous solution of A is basic while that of B is acidic. Therefore A has pH greater than 7 and B has pH less than 7.

26. **(d)** Since Z catches fire immediately during reaction and the reaction with water is highly exothermic. Hence it should be Na
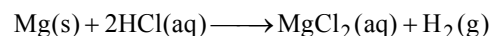
   $\underset{(X)}{Na} + H_2O \longrightarrow \underset{(Y)}{NaOH} + \underset{(Z)}{H_2} + Energy$
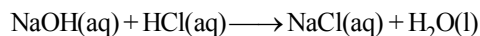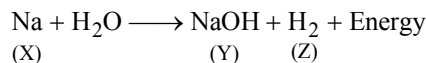
   $NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(l)$
   $X = Na, Y = NaOH, Z = H_2$

27. **(c)** The value of x, y, z are 8, 4, 4 respectively hence the reaction is

   $H_2SO_4 + 8HI \to H_2S + 4I_2 + 4H_2O$
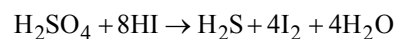
28. **(a)** Fizzing in the reaction occurs due to the evolution of the H_2 gas by the action of acid on a metal (magnesium).

   $Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$

   (test tube A)

$$Mg(s) + 2CH_3COOH(aq) \longrightarrow$$
(test tube B)
$$(CH_3COO)_2 Mg(aq) + H_2(g)$$
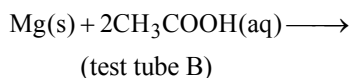
Since HCl is a stronger acid as compared to acetic acid, Fizzing occurs more vigorously in test tube A.

Note : HCl is mineral acid (completely ionised) whereas CH_3COOH is an organic acid (slightly ionised).

29. (a) $2CsO_2 + 2H_2O \longrightarrow 2CsOH + H_2O_2 + O_2$

CsO_2 is the oxide of alkali metal. It is a basic oxide. Due to formation of CsOH its aqueous solution is basic.

30. (d)   31. (b)   32. (d)   33. (a)   34. (a)

35. (d) Decomposition of vegetable matter into compost is an exothermic reaction.

36. (c)   37. (d)   38. (a)

39. (a) $\dfrac{Sin\, i}{Sin\, r} = \dfrac{V_1}{V_2} \Rightarrow \dfrac{Sin\, 30}{Sin\, 60} = \dfrac{V}{V'} \Rightarrow V' = \sqrt{3}V$

40. (a) A ray parallel to principal axis must pass through focus and a ray passing through focus must go parallel to principal axis.

41. (d)   42. (c)

43. (c) Radius of curvature, $R = +3.00\, m$; Object-distance, $u = -5.00\, m$; Image-distance, $v = ?$ Height of the image, $h' = ?$

Focal length, $f = R/2 = +\dfrac{3.00\, m}{2} = +1.50\, m$

Since $\dfrac{1}{v} + \dfrac{1}{u} = \dfrac{1}{f}$

or $\dfrac{1}{v} = \dfrac{1}{f} - \dfrac{1}{u} = +\dfrac{1}{1.50} - \dfrac{1}{(-5.00)} = \dfrac{1}{1.50} + \dfrac{1}{5.00} = \dfrac{5.00 + 1.50}{7.50}$

$\Rightarrow v = \dfrac{+7.50}{6.50} = +1.15\, m$

44. (a) $n_{21} = \dfrac{n_2}{n_1} = \dfrac{\sin i}{\sin r} = \dfrac{v_1}{v_2} = \dfrac{\lambda_1}{\lambda_2}$

45. (d) According to Snell's law
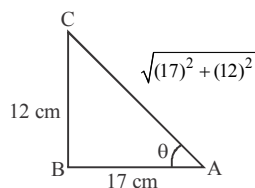$\eta_1 \sin\theta_1 = \eta_2 \sin\theta_2$
$\eta_{oil} \sin\theta = \eta_{air} \sin 90°$

$\eta_{oil} = \dfrac{1}{\sin\theta} (\eta_{air} = 1)$

$\eta_{oil} = \dfrac{1}{12} \times \sqrt{17^2 + 12^2} = \dfrac{1}{12} \times \sqrt{289} + 144$

$= \dfrac{1}{12} \times \sqrt{433}$

46. (a) Convex lens can form image with m < 1, m > 1 and m = 1 depending upon the position of the object. Convex lens forms magnified image (m > 1) when the object is pole and 2f, same size as the object (m = 1) when the object is at 2f and smaller image (m < 1), when the object is beyond 2f.

47. (c)

48. (d) pH7 indicates neutral nature.

49. (c) Ag does not displace hydrogen from acids since it is below hydrogen in activity series.

50. (c) Since silver is less reactive than copper it does not react with copper sulphate solution.

51. (a) Gold is a noble metal.

52. (d)   53. (c)   54. (c)   55. (b)   56. (d)

57. (b) Here, size of object, $h = 3\, cm$
$u = -10\, cm$ (sign convention)
$f = -20\, cm$ (sign convention)

Using $\dfrac{1}{u} + \dfrac{1}{v} = \dfrac{1}{f}$,

we have $-\dfrac{1}{10} + \dfrac{1}{v} = -\dfrac{1}{20}$ or $\dfrac{1}{v} = -\dfrac{1}{20} + \dfrac{1}{10} = \dfrac{1}{20}$

$\therefore v = 20\, cm$

58. (c) Object-size, $h = +4.0\, cm$; Object-distance, $u = -25.0\, cm$; Focal length, $f = -15.0\, cm$; Image-distance, $v = ?$ Image-size, $h' = ?$

From $\dfrac{1}{v} + \dfrac{1}{u} = \dfrac{1}{f}$

or $\dfrac{1}{v} = \dfrac{1}{f} - \dfrac{1}{u} = \dfrac{1}{-15.0} - \dfrac{1}{-25.0} = -\dfrac{1}{15.0} + \dfrac{1}{25.0}$

or $\dfrac{1}{v} = \dfrac{-5.0 + 3.0}{75.0} = \dfrac{-2.0}{75.0}$ or $v = -37.5\, cm$.

The screen should be placed at 37.5 cm. from the mirror.

59. (a)

60. (d) Here, (using sign convention)

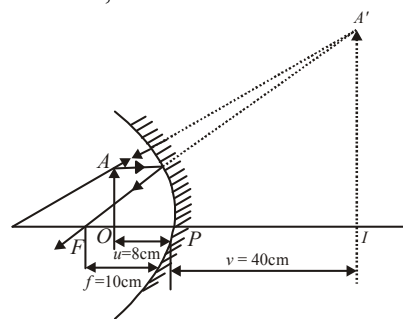Focal length, $f = -10\, cm$
Object distance, $u = -8\, cm$

Image distance, $v = ?$

From mirror formula, $\dfrac{1}{u} + \dfrac{1}{v} = \dfrac{1}{f}$

Putting values, we get

$\dfrac{1}{v} = \dfrac{1}{-10} - \dfrac{1}{-8} = \dfrac{-4+5}{40} = \dfrac{1}{40}$

$\therefore v = +40\, cm$

The image is formed at a distance of 40 cm behind the mirror.