Exercise - I Objective Type

Fill in the blank :

1. For the reaction

$2x + 3y + 4z \rightarrow 5w$

Initially if 1 mole of x, 3 mole of y and 4 mole of z is taken. If 1.25 mole of w is obtained then % yield of this reaction is _____.

Sol.

2. A solution of A (MM = 20) and B (MM = 10), [Mole fraction $X_B = 0.6$] having density 0.7 gm/ml then molarity and molality of B in this solution will be _____ and _____ respectively.

Sol.

3. 125 ml of 8% w/w NaOH solution (sp. gravity 1) is added to 125 ml of 10% w/v HCl solution. The nature of resultant solution would be _____

Sol.

4. Ratio of masses of H_2SO_4 and $Al_2(SO_4)_3$ is grams each containing 32 grams of **S** is _____.

Sol.

5. The vapour density of a mixture of gas A (Molecular mass = 40) and gas B (Molecular mass = 80) is 25. Then mole % of gas B in the mixture would be _____

Sol.

6. For the reaction

$2A + 3B + 5C \rightarrow 3D$

Initially if 2 mole of A, 4 mole of B and 6 mole of C is taken, With 25% yield, moles of D which can be produced are _____.

Sol.

7. Fill in the blanks in the following table.

Compound	Grams Compd	Grams Water	Molality of Compd	Mole Fraction of Compd
Na_2CO_3	_____	250	0.0125	_____
CH_3OH	13.5	150	_____	_____
KNO_3	_____	555	_____	0.0934

Sol.

Single Correct :

8. Equal volumes of 10% (v/v) of HCl is mixed with 10% (v/v) NaOH solution. If density of pure NaOH is 1.5 times that of pure HCl then the resultant solution be :

(A) basic (B) neutral

(C) acidic (D) can't be predicted.

Sol.

9. A definite amount of gaseous hydrocarbon was burnt with just sufficient amount of O_2. The volume of all reactants was 600 ml, after the explosion the volume of the products [$CO_2(g)$ and $H_2O(g)$] was found to be 700 ml under the similar conditions. The molecular formula of the compound is :

(A) C_3H_8 (B) C_3H_6 (C) C_3H_4 (D) C_4H_{10}

Sol.

10. One gram of the silver salt of an organic dibasic acid yields, on strong heating, 0.5934 g of silver. If the weight percentage of carbon in it 8 times the weight percentage of hydrogen and half the weight percentage of oxygen, determine the molecular formula of the acid. [Atomic weight of Ag = 108]

(A) $C_4H_6O_4$ (B) $C_4H_6O_6$ (C) $C_2H_6O_2$ (D) $C_5H_{10}O_5$

Sol.

11. One mole mixture of CH_4 & air (containing 80% N_2 20% O_2 by volume) of a composition such that when underwent combustion gave maximum heat (assume combustion of only CH_4). Then which of the statements are correct, regarding composition of initial mixture. (X presents mole fraction)

(A) $X_{CH_4} = \frac{1}{}, X_{O_2} = \frac{2}{}, X_{N_2} = \frac{8}{}$

(B) $X_{CH_4} = \frac{3}{8}, X_{O2} = \frac{1}{8}, X_{N_2} = \frac{1}{2}$

(C) $X_{CH_4} = \frac{1}{6}, X_{O2} = \frac{1}{6}, X_{N_2} = \frac{2}{3}$

(D) Data insufficient

12. $C_6H_5OH(g) + O_2(g) \rightarrow CO_2(g) + H_2O(l)$

Magnitude of volume change if 30 ml of C_6H_5OH (g) is burnt with excess amount of oxygen, is

(A) 30 ml (B) 60 ml (C) 20 ml (D) 10 ml

Sol.

13. 10 ml of a compound containing 'N' and 'O' is mixed with 30 ml of H_2 to produce H_2O (l) and 10 ml of N_2(g). Molecular formula of compound if both reactants reacts completely, is

(A) N_2O (B) NO_2 (C) N_2O_3 (D) N_2O_5

Sol.

14. Similar to the % labelling of oleum, a mixture of H_3PO_4 and P_4O_{10} is labelled as (100 + x) % where x is the maximum mass of water which can react with P_4O_{10} present in 100 gm mixture of H_3PO_4 and P_4O_{10}. If such a mixture is labelled as 127% Mass of P_4O_{10} is 100 gm of mixture, is

(A) 71 gm (B) 47 gm (C) 83gm (D) 35 gm

Sol.

15. Mass of sucrose $C_{12}H_{22}O_{11}$ produced by mixing 84 gm of carbon, 12 gm of hydrogen and 56 lit. O_2 at 1 atm & 273 K according to given reaction, is

$$C(s) + H_2(g) + O_2(g) \rightarrow C_{12}H_{22}O_{11}(s)$$

(A) 138.5 (B) 155.5 (C) 172.5 (D) 199.5

Sol.

16. If 50 gm oleum sample rated as 118% is mixed with 18 gm water, then the correct option is

(A) The resulting solution contains 18 gm of water and 118 gm H_2SO_4

(B) The resulting solution contains 9 gm of water and 59 gm H_2SO_4

(C) The resulting solution contains only 118 gm pure H_2SO_4

(D) The resulting solution contains 68 gm of pure H_2SO_4

Sol.

17. In the quantitative determination of nitrogen using Duma's method, N_2 gas liberated from 0.42 gm of a sample of organic compound was collected over water. If the volume of N_2 gas collected was $\frac{100}{\quad}$ ml at total pressure 860 mm Hg at 250 K, % by mass of nitrogen in the organic compound is

[Aq. tension at 250K is 24 mm Hg and R = 0.08 L atm mol^{-1} K^{-1}]

(A) $\frac{10}{3}\%$ (B) $\frac{5}{3}\%$ (C) $\frac{20}{3}\%$ (D) $\frac{100}{3}\%$

Sol.

18. 40 gm of a carbonate of an **alkali metal** or **alkaline earth metal** containing some inert impurities was made to react with excess HCl solution. The liberated CO_2 occupied 12.315 lit. at 1 atm & 300 K. The correct option is

(A) Mass of impurity is 1 gm and metal is Be

(B) Mass of impurity is 3 gm and metal is Li

(C) Mass of impurity is 5 gm and metal is Be

(D) Mass of impurity is 2 gm and metal is Mg

Sol.

19. The percentage by mole of NO_2 in a mixture NO_2(g) and NO(g) having average molecular mass 34 is :

(A) 25% (B) 20% (C) 40% (D) 75%

Sol.

20. The minimum mass of mixture of A_2 and B_4 required to produce at least 1 kg of each product is :

(Given At. mass of 'A' = 10; At mass of 'B' = 120)

$$5A_2 + 2B_4 \rightarrow 2AB_2 + 4A_2B$$

(A) 2120 gm (B) 1060 gm (C) 560 gm (D) 1660 gm

Sol.

21. The mass of CO_2 produced from 620 gm mixture of $C_2H_4O_2$ & O_2, prepared to produce maximum energy is

(A) 413.33 gm (B) 593.04 gm (C) 440 gm (D) 320 gm

Sol.

22. Assuming complete precipitation of AgCl, calculate the sum of the molar concentration of all the ions if 2 lit of 2M Ag_2SO_4 is mixed with 4 lit of 1 M NaCl solution is :

(A) 4M (B) 2M (C) 3M (D) 2.5 M

Sol.

23. 12.5 gm of fuming H_2SO_4 (labelled as 112%) is mixed with 100 lit water. Molar concentration of H^+ in resultant solution is :

[Note : Assume that H_2SO_4 dissociate completely and there is no change in volume on mixing]

(A) $\frac{2}{700}$ (B) $\frac{2}{350}$ (C) $\frac{3}{350}$ (D) $\frac{3}{700}$

Sol.

24. 74 gm of sample on complete combustion gives 132 gm CO_2 and 54 gm of H_2O. The molecular formula of the compound may be

(A) C_5H_{12} (B) $C_4H_{10}O$ (C) $C_3H_6O_2$ (D) $C_3H_7O_2$

25. The % by volume of C_4H_{10} in a gaseous mixture of C_4H_{10}, CH_4 and CO is 40. When 200 ml of the mixture is burnt in excess of O_2. Find volume (in ml) of CO_2 produced.

(A) 220 (B) 340 (C) 440 (D) 560

Sol.

26. What volumes should you mix of 0.2 M NaCl arid 0.1 M $CaCl_2$ solution so that in resulting solution the concentration of positive ion is 40% lesser than concentration of negative ion. Assuming total volume of solution 1000 ml.

(A) 400 ml NaCl, 600 ml $CaCl_2$ (B) 600 ml NaCl, 400 ml $CaCl_2$

(C) 800 ml NaCl, 200 ml $CaCl_2$ (D) None of these

Sol.

27. An iodized salt contains 0.5% of Nal. A person consumes 3 gm of salt everyday. The number of iodide ions going into his body everyday is

(A) 10^{-4} (B) 6.02×10^{-4} (C) 6.02×10^{19} (D) 6.02×10^{23}

Sol.

28. The pair of species having same percentage (mass) of carbon is :

(A) CH_3COOH and $C_6H_{12}O_6$

(B) CH_3COOH and C_2H_5OH

(C) $HCOOCH_3$ and $C_{12}H_{22}O_{11}$

(D) $C_6H_{12}O_6$ and $C_{12}H_{22}O_{11}$

Sol.

29. 200 ml of a gaseous mixture containing CO, CO_2 and N_2 on complete combustion in just sufficient amount of O_2 showed contraction of 40 ml. When the resulting gases were passed through KOH solution it reduces by 50 % then calculate the volume ratio of $V_{CO_2} : V_{CO} : V_{N_2}$ in original mixture.

(A) 4 : 1 : 5 (B) 2 : 3 : 5 (C) 1 : 4 : 5 (D) 1 : 3 : 5

Sol.

30. Density of a gas relative to air is 1.17. Find the mol. mass of the gas. [M_{air} = 29 g/mol]

(A) 33.9 (B) 24.7 (C) 29 (D) 22.3

Sol.

More than one correct :

Q.31 Two gases A and B which react according to the equation

$$aA_{(g)} + bB_{(g)} \rightarrow cC_{(g)} + dD_{(g)}$$

to give two gases C and D are taken (amount not known) in an Eudiometer tube (operating at a constant Pressure and temperature) to cause the above.

If on causing the reaction there is no volume change observed then which of the following statement is/ are correct.

(A) (a + b) = (c + d)

(B) average molecular mass may increase or decrease if either of A or B is present in limited amount.

(C) Vapour Density of the mixture will remain same throughout the course of reaction.

(D) Total moles of all the component of mixture will change.

Sol.

32. A mixture of C_3H_8 (g) O_2 having total volume 100 ml in an Eudiometry tube is sparked & it is observed that a contraction of 45 ml is observed what can be the composition of reacting mixture.

(A) 15 ml C_3H_8 & 85 ml O_2 (B) 25 ml C_3H_8 & 75 ml O_2

(C) 45 ml C_3H_8 & 55 ml O_2 (D) 55 ml C_3H_8 & 45 ml O_2

Sol.

33. An aqueous solution consisting of 5 M $BaCl_2$, 58.8% w/v NaCl solution & 2m Na_2X has a density of 1.949 gm/ml. Mark the option(s) which represent correct molarity (M) of the specified ion.

[Assume 100% dissociation of each salt and molecular mass of X^{2-} is 96]

(A) $[Cl^-]$ = 20 M (B) $[Na^+]$ = 11 M

(C) [Total anions] = 20.5 M (D) [Total cations]=15 M

Sol.

34. A mixture of 100 ml of CO, CO_2 and O_2 was sparked. When the resulting gaseous mixture was passed through KOH solution, contraction in volume was found to be 80 ml, the composition of initial mixture may be (in the same order)

(A) 30 ml, 60 ml, 10 ml (B) 30 ml, 50 ml, 20 ml

(C) 50 ml, 30 ml, 20 ml (D) 30 ml, 40 ml, 30 ml

Sol.

35. Given following series of reactions :

(I) $NH_3 + O_2 \rightarrow NO + H_2O$

(II) $NO + O_2 \rightarrow NO_2$

(III) $NO_2 + H_2O \rightarrow HNO_3 + HNO_2$

(IV) $HNO_2 \rightarrow HNO_3 + NO + H_2O$

Select the correct option (s) :

(A) Moles of HNO_3 obtained is half of moles of Ammonia used if HNO_2 is not used to produce HNO_3 by reaction (IV)

(B) $\frac{100}{6}$% more HNO_3 will be produced if HNO_2 is used to produce HNO_3 by reaction (IV) than if HNO_2 is not used to produce HNO_3 by reaction (IV)

(C) If HNO_2 is used to produce HNO_3 then $\frac{1}{4}$th of total HNO_3 is produced by reaction (IV)

(D) Moles of NO produced in reaction (IV) is 50% of moles of total HNO_3 produced.

Sol.

36. Solution(s) containing 40 gm NaOH is/are

(A) 50 gm of 80% (w/w) NaOH

(B) 50 gm of 80% (w/v) NaOH [d_{soln} = 1.2 gm/ml]

(C) 50 gm of 20 M NaOH [d_{soln} = 1 gm/ml]

(D) 50 gm of 5m NaOH

Sol.

37. The **incorrect** statement(s) regarding 2M $MgCl_2$ aqueous solution is/are ($d_{solution}$ = 1.09 gm/ml)

(A) Molality of Cl is 4.44 m

(B) Mole fraction of $MgCl_2$ is exactly 0.035

(C) The conc. of $MgCl_2$ is 19% w/v

(D) The conc. of $MgCl_2$ is 19×10^4 ppm

Sol.

38. An organic compound is burnt with excess of O_2 to produce CO_2 (g) and $H_2O(\ell)$, which results in 25% volume contraction. Which of the following option(s) satisfy the given conditions.

(A) 10 ml C_3H_8 + 110 ml O_2

(B) 20 ml C_2H_6O + 80 ml O_2

(C) 10 ml $C_3H_6O_2$ + 50 ml O_2

(D) 40 ml $C_2H_2O_4$ + 60 ml O_2

Sol.

39. A sample of H_2O_2 solution labelled as 56 volume has density of 530 gm/L. Mark the correct option(s) representing concentration of same solution in other units. (Solution contains only H_2O and H_2O_2)

(A) $M_{H_2O_2} = 6$ (B) % $\frac{w}{v} = 17$

(C) Mole fraction of H_2O_2 = 0.25 (D) $m_{H_2O_2} = \frac{1000}{72}$

Sol.

40. Solution(s) containing 30 gm CH_3COOH is/are

(A) 50 gm of 70% (w/v) CH_3COOH [d_{sol} = 1.4 gm/ml]

(B) 50 gm of 10 M CH_3COOH [d_{sol} = 1 gm/ml]

(C) 50 gm of 60% (w/w) CH_3COOH

(D) 50 gm of 10 m CH_3COOH

Sol.

41. '2V' ml of 1 M Na_2SO_4 is mixed with 'V' ml of 2M $Ba(NO_3)_2$ solution.

(A) Molarity of Na^+ ion in final solution can't be calculated as V is not known.

(B) Molarity of $BaSO_4$ in final solution is $\frac{2}{3}$M

(C) Molarity of NO_3^- in final solution is $\frac{4}{3}$M

(D) Molarity of NO_3^- in final solution is $\frac{2}{3}$M

Sol.

Match the Column :

42. One type of artifical diamond (commonly called YAG for yttrium aluminium garnet) can be represented by the formula $Y_3Al_5O_{12}$ **[Y = 89, Al = 27]**

	Column I		**Column II**
	Element		Weight percentage
(A)	Y	(P)	22.73 %
(B)	Al	(Q)	32.32 %
(C)	O	(R)	44.95 %

Q.43 The recommended daily dose is 17.6 milligrams of vitamin C (ascorbic acid) having formula $C_6H_8O_6$.

Match the following. Given : $N_A = 6 \times 10^{23}$

	Column I	**Column II**
(A)	O-atoms present	(P) 10^{-4} mole
(B)	Moles of vitamin C in 1gm of vitamin C	(Q) 5.68×10^{-3}
(C)	Moles of vitamin C in 1gm should be consumed daily	(R) 3.6×10^{20}

Sol.

44.

Column I	Column II
(A) 10 M MgO (d_{sol} = 1.20 gm/ml) Solute: MgO, Solvent:H_2O	(P) $W_{solvent}$ = 120 gm per 100 ml of solution.
(B) 40% w/v NaOH ($d_{sol.}$ = 1.6 gm/ml) Solute:NaOH,Solvent:H_2O	(Q) W_{sol} = 150 gm per 100 gm solvent
(C) 8 m $CaCO_3$ Solute:$CaCO_3$,Solvent:H_2O	(R) W_{solute} = 120 gm per 100 gm of solvent
(D) 0.6 mol fraction of 'X' (molecular mass = 20) in 'Y' (molecular mass 25) Solute : X, Solvent : Y	(S) $W_{solvent}$ = 125 gm per 100 gm of solute

Sol.

45. Bunty & Bubbly have two separate containers one having N_2 gas & other H_2 gas : It is known that N_2 & H_2 react to give $N_2H_2(l)$ and/or N_2H_4 (g) depending upon the ratio in which N_2 & H_2 are taken & that N_2H_2 reacts with H_2 to give N_2H_4. Formation of 1 mole of N_2H_4 requires 30 units of energy & formation of 1 mole of $N_2H_2(l)$ release 30 units of energy. From this information match **Column I** (representing composition of gases taken) with **Column II** (representing the observation)

Column I (Composition of gases)	Column II (Observation)
(A) 40 lit N_2 & 30 lit H_2 (same tem perature & pressure)	(P) Contraction by 22.4 lit
(B) 11.2 lit of N_2 & H_2 taken at 1 atm & 273 K in a ratio such that max. release of energy is observed	(Q) Contraction by 20 lit.
(C) 11.2 lit of N_2 & 30 lit of H_2 (same temperature & pressure)	(R) Contraction by 60 lit
(D) 10 lit of N_2 & more than 22.4 lit of H_2 (same temperature & pressure)	(S) Contraction by 11.2 lit

Sol.

46. Br_2 reacts with O_2 in either of the following ways depending upon supply of O_2.

$$Br_2 + \frac{1}{2}O_2 \rightarrow Br_2O$$

$$Br_2 + \frac{3}{2}O_2 \rightarrow Br_2O_3$$

Match composition of the final mixture for initial amount of reactants.

Column I (Initial reactants)	Column II (Final product)
(A) 320 gm Br_2 is mixed with 64 gm of O_2	(P) 1 mole Br_2O_3
(B) 160 gm Br_2 is mixed with 8 gm of O_2	(Q) $\frac{1}{2}$ mole (Br_2O), $\frac{1}{2}$ mole (Br)
(C) 80 gm Br_2 is mixed with gm of O_2	(R) 1 mole (Br_2O), 1 32 mole (Br_2O_3)
(D) 160 gm Br_2 is mixed with 48 gm of O_2	(S) $\frac{1}{2}$ mole (Br_2O_3), $\frac{1}{4}$ mole (O_2)

Sol.

COMPREHENSION

47. A 4.925 g sample of a mixture of $CuCl_2$ and $CuBr_2$ was dissolved in water and mixed thoroughly with a 5.74 g portion of AgCl. After the reaction the solid, a mixture of AgCl, and AgBr, was filtered, washed, and dried. Its mass was found to be 6.63 g.

(a) % By mass of $CuBr_2$ in original mixture is

(A) 2.24 (B) 74.5 (C) 45.3 (D) None

(b) % By mass of Cu in original mixture is

(A) 38.68 (B) 19.05 (C) 3.86 (D) None

(c) % by mole of AgBr in dried precipitate is

(A) 25 (B) 50 (C) 75 (D) 60

(d) No. of moles of ^{O} ion present in the solution after precipitation are

(A) 0.06 (B) 0.02 (C) 0.04 (D) None

Sol.

48. NaBr, used to produce AgBr for use in photography can be self prepared as follows :

$Fe + Br_2 \rightarrow FeBr_2$ ...(i)

$FeBr_2 + Br_2 \rightarrow Fe_3Br_8$ ...(ii) (not balanced)

$Fe_3Br_8 + Na_2CO_3 \rightarrow NaBr + CO_2 + Fe_3O_4$ ...(iii) (not balanced)

(a) Mass of iron required to produce 2.06×10^3 kg NaBr

(A) 420 gm (B) 420 kg

(C) 4.2×10^5 kg (D) 4.2×10^8 gm

(b) If the yield of (ii) is 60% & (iii) reaction is 70% then mass of iron required to produce 2.06×10^3 kg NaBr

(A) 10^5kg (B) 10^5 gm (C) 10^3 kg (D) None

(c) If yield of (iii) reaction is 90% then mole of CO_2 formed when 2.06×10^3 gm NaBr is formed :

(A) 20 (B) 10 (C) 40 (D) None

Sol.

49. N_2O_5 and H_2O can react to form HNO_3, according to given reaction

$$N_2O_5 + H_2O \rightarrow 2HNO_3$$

the concentration of a mixture of HNO_3 and N_2O_5(g) can be expressed similar to oleum. Then answer the following question.

(a) Find the percentage labelling of a mixture containing 23 gm HNO_3 and 27 gm N_2O_5.

(A) 104.5% (B) 109% (C) 113.5% (D) 118%

(b) Find the maximum and minimum value of percentage labelling :

(A) 133.3% (B) 116.66%, 0%

(C) 116.66%, 100% (D) None

(c) Find the new labelling if 100 gm of this mixture (original) is mixed with 4.5 gm water

(A) $100 + \frac{4.5}{1}$ (B) $100 + \frac{4.5}{1.045}$

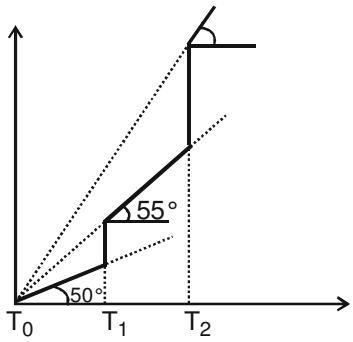
(C) $100 + \frac{4.5}{104.5}$ (D) $100 + \frac{4.5}{1.09}$

Sol.

50. For a gaseous reaction,

$2A(g) \rightarrow 3B(g) + C(g)$

Whose extent of dissociation depends on temperature is performed in a closed container, it is known that extent of dissociation of A is different in different temperature range. With in a temperature range it is constant. (Temperature range $T_0 - T_1$, $T_1 - T_2$, $T_2 - T_\infty$). A plot of P v/s T is drawn under the given condition. Given : tan 55 = 1.42, tan 50 = 1.19, tan 60 = 1.73



(a) If ${}^{\alpha}T_i - T_{i+1}$ is the degree of dissociation of A then in the temperature range $T_i \rightarrow T_{i+1}$

(A) $\alpha_{T_0-T_i}$ is lowest (B) $\alpha_{T_0-T_i}$ is highest

(C) $\alpha_{T_2-T_\infty} = 1$ (D) $\alpha_{T_2-T_\infty} = 0$

(b) If initially 1 mole of A is taken in a 0.0821 *l* container then [R = 0.0821 atm lit/k]

(A) $\alpha_{T_0-T_i} = 0.19$ (B) $\alpha_{T_0-T_1} = 0.095$

(C) $\alpha_{T_1-T_2} = 0.42$ (D) $\alpha_{T_1-T_2} = 0.73$

Sol.

51. A 10 ml mixture of N_2, a alkane & O_2 undergo combustion in Eudiometry tube. There was contraction of 2 ml, when residual gases are passed through KOH. To the remaining mixture comprising of only one gas excess H_2 was added & after combustion the gas produced is absorbed by water, causing a reduction in volume of 8 ml.

(a) Gas produced after introduction of H_2 in the mixture ?

(A) H_2O (B) CH_4 (C) CO_2 (D) NH_3

(b) Volume of N_2 present in the mixture ?

(A) 2 ml (B) 4 ml (C) 6 ml (D) 8 ml

(c) Volume of O_2 remained after the first combustion ?

(A) 4 ml (B) 2 ml (C) 0 (D) 8 ml

(d) Identify the hydrocarbon.

(A) CH_4 (B) C_2H_6 (C) C_3H_8 (D) C_4H_{10}

Sol.

ANSWER-KEY

Exercise-I

1. 50% **2.** 30M, 75 m **3.** Acidic **4.** 0.86 **5.** 25% **6.** 0.75

7. 0.331, 2.25×10^{-4}, 2.81, 0.0482, 321, 5.72 **8.** A **9.** A **10.** B **11.** A

12. B **13.** C **14.** A **15.** B **16.** B **17.** A **18.** B

19. A **20.** A **21.** C **22.** B **23.** A **24.** C **25.** C

26. D **27.** C **28.** C **29.** C **30.** A **31.** A,C **32.** A, B

33. A,B,C **34.** A,B **35.** A,C,D **36.** A,C **37.** B,D **38.** A,C **39.** B,D

40. B,C **41.** C **42.** (A) R, (B) P, (C) Q **43.** (A) R, (B) Q, (C) P

44. (A) Q; (B) P; (C) S; (D) R **45.** (A) R; (B) S; (C) P; (D) Q **46.** (A) R, (B) Q, (C) S, (D) P

47. (a) C; (b) A; (c) B (d) A **48.** (a) B; (b) C; (c) B **49.** (a) B; (b) C; (c) B **50.** (a) A; (b) A

51. (a) D; (b) B; (c) C; (d) A