

WEEKLY TEST TYJ-02 TEST - 3 RAJPUR ROAD
SOLUTION Date 28-07-2019

[CHEMISTRY]

16. Ratio of atoms C : H : Cl :: $\frac{47.5}{12} : \frac{2.54}{1} : \frac{50}{35.5} :: 3.96 : 2.54 : 1.41 :: 2.8 : 1.8 : 1$
 $:: 14 : 9 : 5$
 Empirical formula = $C_{14}H_9Cl_5$

17. 300 mL of a gas weighs 0.368 g
 1 mL of a gas will weigh = $\frac{0.368}{300}$ g
 22400 mL of a gas will weigh = $\frac{0.368}{300} \times 22400 = 27.477 \approx 27.5$ g

18. Gram molecular mass of NH_3 is 17 g.
 \therefore No. of molecules in 4.25 g of $NH_3 = \frac{4.25}{17} N_A = \frac{N_A}{4}$
 Now, one molecule of NH_3 contains 4 atoms
 $\therefore \frac{N_A}{4}$ molecules contain $\frac{N_A}{4} \times 4 = N_A$ atoms
 Again, 32 g of $O_2 = N_A$ molecules = $2N_A$ atoms
 $\therefore 8$ g of $O_2 = \frac{N_A}{32} \times 8 = \frac{N_A}{4}$ molecules $\frac{2N_A}{32} \times 8 = \frac{N_A}{2}$ atoms
 On the other hand,
 2g of $H_2 = N_A$ molecules = $2N_A$ atoms
 4g of He = N_A atoms [\because gram atomic mass of He = 4g]

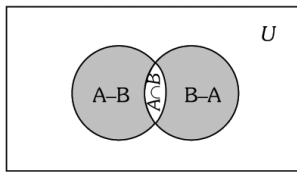
19. Ammonium dichromate is $(NH_4)_2Cr_2O_7$.
 1 mole consists of 2 atoms of N, 8 atoms of H, 2 atoms of Cr, and 7 atoms of O.
 So, total no. of atoms = $(2 + 8 + 2 + 7) \times 6.023 \times 10^{23}$
 $= 114.437 \times 10^{23}$

20. Volume of 44g of $N_2O = 22.4$ L at STP
 Volume of 1 g of N_2O occupies $\frac{22.4}{44}$ L
 Volume of 4.4 g of N_2O occupies $\frac{22.4}{44} \times 4.4 = 2.24$ L

21. $2\text{KClO}_{3(s)} \rightarrow 2\text{KCl}_{(s)} + 3\text{O}_{2(g)}$
 Molar mass of $\text{KClO}_3 = 122.5$
 245 g of KClO_3 gives 96 g of O_2
- $$245 \text{ g of } \text{KClO}_3 = \frac{245}{122.5} \text{ mol} = 2 \text{ mol} \text{ and } 48 \text{ g of } \text{O}_2 = \frac{48}{16} = 3 \text{ mol}$$
- 3 mole of O_2 is produced by 2 mol of KClO_3
 1 mol of O_2 is produced by $\frac{2}{3}$ mol of KClO_3
- 2.4 mol of O_2 is produced by $\frac{2}{3} \times 2.4$ mol of $\text{KClO}_3 = 1.6$ mol of KClO_3

[MATHEMATICS]

31. (a) From Venn-Euler's diagram,



$$\therefore (A-B) \cup (B-A) \cup (A \cap B) = A \cup B.$$

32. (c) Let A denote the set of Americans who like cheese and let B denote the set of Americans who like apples.

Let Population of American be 100.

Then $n(A) = 63, n(B) = 76$

$$\begin{aligned} \text{Now, } n(A \cup B) &= n(A) + n(B) - n(A \cap B) \\ &= 63 + 76 - n(A \cap B) \end{aligned}$$

$$\therefore n(A \cup B) + n(A \cap B) = 139$$

$$\Rightarrow n(A \cap B) = 139 - n(A \cup B)$$

But $n(A \cup B) \leq 100$

$$\therefore -n(A \cup B) \geq -100$$

$$\therefore 139 - n(A \cup B) \geq 139 - 100 = 39$$

$$\therefore n(A \cap B) \geq 39 \text{ i.e., } 39 \leq n(A \cap B) \quad \dots(i)$$

Again, $A \cap B \subseteq A, A \cap B \subseteq B$

$$\therefore n(A \cap B) \leq n(A) = 63 \text{ and } n(A \cap B) \leq n(B) = 76$$

$$\therefore n(A \cap B) \leq 63 \quad \dots(ii)$$

Then, $39 \leq n(A \cap B) \leq 63 \Rightarrow 39 \leq x \leq 63.$

33. (b) Since $2^m - 2^n = 56 = 8 \times 7 = 2^3 \times 7$
 $\Rightarrow 2^n(2^{m-n} - 1) = 2^3 \times 7, \therefore n = 3$ and $2^{m-n} = 8 = 2^3$
 $\Rightarrow m - n = 3 \Rightarrow m - 3 = 3 \Rightarrow m = 6; \therefore m = 6, n = 3.$

34. (c) The number of proper subset = $2^n - 1$
= $2^5 - 1 = 32 - 1 = 31$.

35. (a) Since $A \subseteq B$, $\therefore A \cap B = A$
 $\therefore n(A \cap B) = n(A) = 3$.

(c) $n(P) = 25\%$, $n(C) = 15\%$

$n(P^c \cap C^c) = 65\%$, $n(P \cap C) = 2000$

Since, $n(P^c \cap C^c) = 65\%$

$\therefore n(P \cup C)^c = 65\%$ and $n(P \cup C) = 35\%$

Now, $n(P \cup C) = n(P) + n(C) - n(P \cap C)$

$35 = 25 + 15 - n(P \cap C)$

$\therefore n(P \cap C) = 40 - 35 = 5$. Thus $n(P \cap C) = 5\%$

But $n(P \cap C) = 2000$

36. \therefore Total number of families = $\frac{2000 \times 100}{5} = 40,000$

Since, $n(P \cup C) = 35\%$

and total number of families = 40,000

and $n(P \cap C) = 5\%$. \therefore (2) and (3) are correct.