WEEKLY TEST TYJ-02 TEST - 3 Balliwala
SOLUTION Date 29-07-2019

[CHEMISTRY]

16. Ratio fo 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 weight $= \frac{0.368}{300} \times 22400 = 27.477 \approx 27.5$ g

18 Gram molecular mass of NH_3 is 7 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 contans 4 atoms

$\therefore$ $\frac{N_A}{4}$ molecules contian $\frac{N_A}{4} \times 4 = N_A$ 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 $[\because \text{gram atomic mass of He} = 4g]$

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. $2KClO_{3(s)} \rightarrow 2KCl_{(s)} + 3O_{2(g)}$

Molar mass of $KClO_3 = 122.5$

245 g of $KClO_3$ gives 96 g of O_2

245 g of $KClO_3 = \frac{245}{122.5}\text{mol} = 2\text{mol}$ and 48 g of $O_2 = \frac{48}{16} = 3\text{mol}$

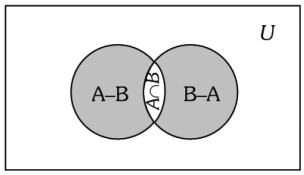
3 mole of O_2 is produced by 2 mol of $KClO_3$

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 ok $KClO_3 = 1.6\text{mol}$ 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 $n(A) = 63, n(B) = 76$

Now, $n(A\cup B) = n(A) + n(B) - n(A\cap B)$

$= 63 + 76 - n(A\cap B)$

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

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

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

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

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

$\therefore\ n(A\cap B) \ge 39$ *i.e.*, $39 \le n(A\cap B)$ .....(i)

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

$\therefore\ n(A\cap B) \le n(A) = 63$ and $n(A\cap B) \le n(B) = 76$

$\therefore n(A\cap B) \le 63$ .....(ii)

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

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

36. (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 $n(P \cap C) = 2000$
$\therefore$ 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.