

48. A 1.50 g sample of type metal (an alloy of Sn, Pb, Cu and Sb) is dissolved in nitric acid, and metastannic acid,  $\text{H}_2\text{SnO}_3$ , precipitates. This is dehydrated by heating to tin (IV) oxide, which is found to weigh 0.50 g. What percentage of tin was in the original type metal sample? (Sn = 119)
- (a) 33.33% (b) 26.27%  
(c) 29.38% (d) 52.54%
49. An amount of 5 moles of A, 6 moles of B and excess amount of C are mixed to produce a final product D, according to the reactions:
- $$\text{A} + 2\text{B} \rightarrow \text{I}$$
- $$\text{I} + \text{C} \rightarrow \text{B} + \text{D}$$
- What is the maximum moles of D, which can be produced assuming that the products formed can also be reused in the reactions?
- (a) 3 moles  
(b) 4.5 moles  
(c) 5 moles  
(d) 6 moles
50. Hydrogen cyanide, HCN, can be made by a two-step process. First, ammonia is reacted with  $\text{O}_2$  to give nitric oxide, NO.
- $$4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{g})$$
- Then nitric oxide is reacted with methane,  $\text{CH}_4$ .
- $$2\text{NO}(\text{g}) + 2\text{CH}_4(\text{g}) \rightarrow 2\text{HCN}(\text{g}) + 2\text{H}_2\text{O}(\text{g}) + \text{H}_2(\text{g})$$
- When 25.5 g of ammonia and 32.0 g of methane are used, how many grams of hydrogen cyanide can be produced?
- (a) 1.5 (b) 2.0  
(c) 40.5 (d) 54.0
51. To determine soluble (free)  $\text{SiO}_2$  in a rock, an alkaline extraction was carried out, as a result of which there was found 1.52% of  $\text{SiO}_2$  in the extract and also 1.02% of  $\text{Al}_2\text{O}_3$ . Considering that, apart from the free  $\text{SiO}_2$ , the extract also contained the  $\text{SiO}_2$  that had passed into it from Kaolin ( $2\text{SiO}_2 \cdot \text{Al}_2\text{O}_3$ ), the percentage of free  $\text{SiO}_2$  in the rock being analysed is (Si = 28, Al = 27)
- (a) 1.20  
(b) 0.32  
(c) 0.50  
(d) 1.52
52. A sample of iron oxide has FeO and  $\text{Fe}_2\text{O}_3$  in the mole ratio 2:1. It is partially oxidized to change this ratio to 1:2. The number of moles of FeO oxidized per mole of initial mixture is
- (a) 0.2  
(b) 0.333  
(c) 0.4  
(d) 0.5
53. When  $x$  g carbon is burnt with  $y$  g oxygen in a closed vessel, no residue is left behind. Which of the following statement is correct regarding the relative amounts of oxygen and carbon?
- (a)  $y/x$  must be less than 1.33  
(b)  $y/x$  must be greater than 1.33  
(c)  $y/x$  must be greater than 2.67  
(d)  $y/x$  must lie between 1.33 and 2.67
54. An amount of 1 mole of calcium cyanamide and 1 mole of water are allowed to react. The number of moles of ammonia produced is
- (a) 3.0 (b) 2.0  
(c) 1.0 (d) 0.67
55. An amount of 1 mole of  $\text{N}_2$  and 4 moles of  $\text{H}_2$  are allowed to react in a vessel and after reaction, water is added. Aqueous solution required 1 mole of HCl for complete reaction. Mole fraction of  $\text{H}_2$  in the gas mixture after reaction is
- (a) 1/6 (b) 5/6  
(c) 1/3 (d) 2/3