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Solution 43

1 mole of SO_2 = Mass of S + 2 x Mass of O = 64 grams

64 g of SO_2 = 1 mole

So, 1 g of SO_2 = 1/64 mole

Now since equal moles of all the substances contain equal number of molecules so, 1/64 mole of O_2 will also contain x molecules like SO_2.

32 g of oxygen = 1 mole

So, 1 g of oxygen = 1/32 mole

Now, 1/64 mole of oxygen contains = x molecules

So, 1/32 mole of oxygen will contain = x x 64/32 = 2x molecules

Solution 44

Mass of one molecule of substance = 4.65×10^{-23} u

So, mass of 1 mole of substance = Mass of 6.022×10^{23} molecules of the substance

$$= 4.65 \times 10^{-23} \times 6.022 \times 10^{23} \text{ u} = 28 \text{ u}$$

The substance is Nitrogen with molecular mass 28 u.

Solution 45

Molar mass of SO_2 = (32 + 2x16) g = 64g

Molar mass of oxygen (O_2) = 32g

Given mass of SO_2 = 10g = Given mass of oxygen (O_2)

1 mole of substance = 6.023×10^{23} particles of the substance

(a). No. of moles of SO_2 = 10g/64g = 0.15

Total no. of molecules of SO_2 = $0.15 \times 6.022 \times 10^{23} = 0.90 \times 10^{23}$ molecules of SO_2

(b). No. of moles of O_2 = 10g/32g = 0.31

Total no. of molecules of O_2 = $0.31 \times 6.022 \times 10^{23} = 1.88 \times 10^{23}$ molecules of O_2

Thus, 10g of O_2 contains more no. of molecules.

Solution 46

Given mass of nitrogen = 56g

Molar mass of nitrogen = 14g

No. of moles of nitrogen = 56g/14g = 4 moles

Equal number of moles of all the susbtances contain equal number of molecules.

So, 4 moles of nitrogen and 4 moles of oxygen contains same no. of molecules.

Hence, mass of 4 mole of oxygen = 4 x 16g = 64 g

Solution 47

Given mass of water = 1.8g

Molar mass of water = 18g

No. of moles of water = 1.8g/18g = 0.1 moles

Equal number of moles of all the susbtances contain equal number of molecules.

So, 0.1 moles of water and 0.1 moles of nitrogen contains same no. of molecules.

Hence, mass of 0.1 mole of nitrogen = 0.1 x 28 g = 2.8 g

Solution 48

32 g of S = 1 mole

So, 1 g of S = 1/32 mole

Now since equal moles of all the substances contain equal number of atoms so, 1/32 mole of oxygen will also contain x atoms like S.

16 g of oxygen = 1 mole

So, 1 g of oxygen = 1/16 mole

Now, 1/32 mole of oxygen contains = x atoms

So, 1/16 mole of oxygen will contain = x x 32/16 = 2x atoms

Solution 49

Given mass of carbon = 6g

Molar mass of carbon = 12g

No. of moles of carbon = 6g/12g = 0.5 moles

Equal number of moles of all the susbtances contain equal number of molecules.

So, 0.5 moles of carbon and 0.5 moles of magnesium contains same no. of molecules.

Hence, mass of 0.5 mole of magnesium = 0.5 x 24g = 12g

Solution 50

(i). Mass of 1 g of element X = 2×10^{-23} g

Mass of 1 mole of element X = $2 \times 10^{-23} \times 6.022 \times 10^{23}$ = 12.044 g

Molar mass of the element X = mass of 1 mole of element = 12 u

(ii). Element X is CARBON.

********** END **********