Homework Jan 29 2016

1) $\frac{PV}{RT} = \frac{nRT}{RT}$ $\qquad$ $\frac{PV}{RT} = \frac{nRT}{RT}$

$1\,dm^3 = 1\,L$

$1\,m^3 = 1\times10^3\,L$

$\frac{(452\,kPa)(34\,L)}{\left(8.314\,\frac{kPaL}{molK}\right)(23^\circ C+273)} = n_1$ $\qquad$ $n_2 = \frac{(402\,kPa)(34\,L)}{\left(8.314\,\frac{kPaL}{molK}\right)(18^\circ C+27}$

$n_1 = 6.24\,mol$ $\qquad$ $n_2 = 5.63$

$-5.63\,mol$

$0.61\,mol\,O_2 \times \frac{32\,g}{1\,mol} = \boxed{20.\,g\,O_2}$

2) (2) $\frac{PV}{nR} = \frac{nRT}{nR}$ $\qquad$ (1) $PV = nRT$ STP

$\frac{(2100\,kPa)(1.0\,L)}{(0.759\,mol)\left(8.314\,\frac{kPaL}{molK}\right)} = T$

$17\,L\,O_2 \times \frac{1\,mol}{22.4\,L} = 0.75\,\frac{mol}{O_2}$

OR use $PV = nRT$

$\boxed{T = 330\,K}$

3) $32.4\,g\,CO_2$

$-\,32.0\,g\,CO_2$

$0.4\,g\,CO_2 \times \frac{1\,mol}{44\,g} = 9.1\times10^{-3}\,mol\,CO_2 = mol\,X$

$33.2\,g$

$-\,32.0\,g$

$1.2\,g\,X$

$\frac{1.2\,g\,X}{9.1\times10^{-3}\,mol} = mm\,X = 130\,\frac{g}{mol}$

(A)

4) $16.0\,g\,O_2 \times \frac{1\,mol}{32\,g} = \boxed{0.500\,mol\,O_2}$

(A) $= 0.500\,mol\,He \times \frac{4\,g}{1\,mol} = \boxed{2.00\,g\,He}$

$= 0.500\,mol\,X$

(B) $\frac{20.0\,g}{0.500\,mol} = 40.0\,\frac{g}{mol} = Ar?$

5) ↓ Vol? ⇒ ↑P or ↑ n of gas or ↑T

A) ↓P = ↑V ✗

B) P = 200 kPa > STP!

Vol at STP = 101.3 kPa

∴ ↑V ✗

(C) P = 50 kPa < STP ∴ ↓V ✓

D) ↑T = ↑V = ↑E_k = ↑P ⇒ particles spread out

↑V ✗

6) $800\,g\,C_3H_8 \times \frac{1\,mol}{44\,g} = 18.18\,mol\,C_3H_8 \times \frac{5\,mol\,O_2}{1\,mol\,C_3H_8} =$

make 380 ↗

$= 90.90$ mol O_2

$\frac{PV}{P} = \frac{nRT}{P}$

$V = \frac{(90.90\,mol)(8.34\,\frac{kPa\,L}{mol\,K})(27°C+273)}{(100.\,kPa)}$

↑ make 3sf.

$\boxed{V = 2.3 \times 10^3\,L}$

7) $76.70\,g - 76.52\,g = 0.18\,g$

$$\frac{PV}{RT} = \frac{nRT}{RT}$$

$$n = \frac{(101.3\,kPa)(140\,mL \times \frac{1\,L}{1000\,mL})}{(8.314\,\frac{kPa\,L}{mol\,K})(25°C + 273)}$$

$$= 5.72 \times 10^{-3}\,mol$$

$$mm = \frac{m}{n} = \frac{0.18\,g}{5.72 \times 10^{-3}\,mol} = 31\,\frac{g}{mol} = O_2?$$