

Q1.

- 2 (a)
$$\text{H}_o^x \text{C}_o^x \text{C}_o^x \text{H}_o^x$$
 (1) [1]
- (b)
$$n = \frac{PV}{RT} = \frac{(1515 \times 10^3) \times (76 \times 10^{-3})}{8.31 \times 298}$$
 (1)
- = 46.5 (1) [2]
- (c) (i) $\text{CaC}_2 + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{C}_2\text{H}_2$ (1)
- (ii) $n(\text{C}_2\text{H}_2) = n(\text{CaC}_2) = 100 \times 46.5$ (1)
- mass of $\text{CaC}_2 = 100 \times 46.5 \times 64 =$
- = 297 570 g
- = 297.6 kg (accept 298 kg)
- correct units necessary (1)
- allow e.c.f. on candidate's answer in (b) [3]

Q2.

- 2 (a) there are no inter-molecular forces present between ideal gas molecules
ideal gas molecules have no volume
collisions between ideal gas molecules are perfectly elastic
ideal gas molecules behave as rigid spheres (any 2) [2]
- (b) high temperature (1)
low pressure (1) [2]
- (c) **most ideal** neon..... nitrogen..... ammonia..... **least ideal** (1)
nitrogen has stronger van der Waals' forces than argon (1)
ammonia has hydrogen bonding as well as van der Waals' forces (1) [3]
- (d) with increasing temperature,
average kinetic energy of molecules increases (1)
intermolecular forces are more easily broken (1) [2]

Q3.

$$(d) \quad n = \frac{PV}{RT} = \frac{6 \times 10^5 \times 710 \times 10^{-6}}{8.31 \times 293} = 0.175$$

(1)
(1) [2]

$$(e) \quad P = \frac{nRT}{V} = \frac{0.175 \times 8.31 \times 278}{710 \times 10^{-6}} = 569410.5634 \text{ Pa} = 5.7 \times 10^5$$

(1)
(1)

allow ecf on (d) [2]

Q4.

- (c) (i) for an ideal gas, **any four** from the following
- the molecules behave as rigid spheres (1)
 - there are no/negligible intermolecular forces between the molecules (1)
 - collisions between the molecules are perfectly elastic (1)
 - the molecules have no/negligible volume (1)
 - the molecules move in random motion (1)
 - the molecules move in straight lines (1)
 - the kinetic energy of the molecules is directly proportional to the temperature (1)
 - the pressure exerted by the gas is due to the collisions between the gas molecules and the walls of the container (1)
 - not** an ideal gas obeys $pV = nRT$

(max 4)

- (ii) there are intermolecular forces between CO₂ molecules/
CO₂ molecules have volume (1) [5]