A LEVEL Cambridge Topical Past Papers

CHEMISTRY

PAPER 1 2020 — 2025

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1 - (9701/11_Summer_2020_Q4)

$10\,cm^3$ of ethane is burned in $45\,cm^3$ of oxygen at a pressure of 101 kPa and a temperature of 200 °C. Complete combustion takes place.

What is the total volume of gas present when the reaction is complete, measured under the same conditions?

A $30\,cm^3$ **B** $50\,cm^3$ **C** $55\,cm^3$ **D** $60\,cm^3$

2 - (9701/11_Summer_2020_Q8)

In this question you should use changes in oxidation numbers to balance a chemical equation.

Acidified potassium dichromate(VI) solution can oxidise a solution of V^{2+} ions. The equation for this reaction is shown.

$$a\,Cr_2O_7^{2-} + b\,V^{2+} + c\,H^+ \rightarrow d\,Cr^{3+} + e\,VO_3^- + f\,H_2O$$

What is the ratio $a : b$ in the correctly balanced equation?

A 1 : 1 **B** 1 : 2 **C** 2 : 1 **D** 4 : 1

3 - (9701/11_Summer_2020_Q9)

A sample of argon gas has a mass of 0.20 g, at a pressure of 100 000 Pa and a temperature of 12 °C.

Which volume does the gas occupy?

A $1.2 \times 10^{-4}\,cm^3$

B $5.0\,cm^3$

C $59\,cm^3$

D $119\,cm^3$

4 - (9701/11_Summer_2020_Q11)

A sample of solid ammonium chloride decomposes on heating.

solid ammonium chloride → ammonia gas + hydrogen chloride gas

A total of 2.4×10^{21} molecules of gas is formed.

How many hydrogen atoms are present in the gaseous products?

A 1.2×10^{21} **B** 2.4×10^{21} **C** 4.8×10^{21} **D** 9.6×10^{21}

5 - (9701/11_Summer_2020_Q13)

6.90 g of an ammonium salt is heated with an excess of aqueous sodium hydroxide. The volume of ammonia produced, measured under room conditions, is 2.51 dm^3.

Which ammonium salt is used?

A ammonium carbonate (M_r = 96.0)

B ammonium chloride (M_r = 53.5)

C ammonium nitrate (M_r = 80.0)

D ammonium sulfate (M_r = 132.1)

6 - (9701/11_Summer_2020_Q17)

0.25 g of anhydrous magnesium nitrate is heated strongly until it completely decomposes.

What is the total volume of gas produced, measured under room conditions?

A 40 cm^3 **B** 81 cm^3 **C** 101 cm^3 **D** 202 cm^3

7 - (9701/12_Summer_2020_Q2)

A copper ore contains 3.00% of copper carbonate, $CuCO_3$, by mass.

Which mass of copper would be obtained from 1 tonne of the ore?

A 1.91 kg **B** 3.71 kg **C** 15.4 kg **D** 58.4 kg

8 - (9701/12_Summer_2020_Q5)

In this question you should use changes in oxidation numbers to balance a chemical equation.

The following reaction occurs when MnO_2 is warmed with dilute H_2SO_4.

$$a\ MnO_2 + b\ H^+ \rightarrow c\ Mn^{2+} + d\ MnO_4^- + e\ H_2O$$

What is the ratio of c : d in the correctly balanced equation?

A 1 : 1 **B** 1 : 2 **C** 2 : 3 **D** 3 : 2

9 - (9701/12_Summer_2020_Q6)

In this question you should assume air contains 21% oxygen.

What is the minimum volume of air required to ensure complete combustion of 10 cm^3 of butane gas, under room conditions?

A 14 cm^3 **B** 27 cm^3 **C** 65 cm^3 **D** 310 cm^3

1 – D	21 – B	41 – A	61 – B	81 – C
2 – B	22 – C	42 – A	62 – B	82 – C
3 – D	23 – A	43 – A	63 – A	83 – D
4 – C	24 – A	44 – C	64 – C	84 – C
5 – D	25 – D	45 – D	65 – B	85 – D
6 – C	26 – D	46 – D	66 – A	86 – C
7 – C	27 – A	47 – A	67 – A	87 – A
8 – D	28 – C	48 – C	68 – C	88 – C
9 – D	29 – A	49 – D	69 – C	89 – D
10 – A	30 – C	50 – A	70 – C	90 – B
11 – D	31 – A	51 – C	71 – B	91 – C
12 – C	32 – C	52 – D	72 – B	92 – B
13 – A	33 – B	53 – D	73 – C	93 – C
14 – D	34 – A	54 – B	74 – C	94 – C
15 – B	35 – D	55 – A	75 – C	95 – C
16 – A	36 – A	56 – C	76 – B	96 – C
17 – A	37 – D	57 – D	77 – C	97 – C
18 – D	38 – B	58 – C	78 – A	98 – A
19 – B	39 – D	59 – B	79 – C	99 – B
20 – C	40 – C	60 – D	80 – C	100 – A