10 Mohr's Salt is a common laboratory reagent. Use the information of the most abundant isotopes below to calculate the formula mass, M_r, of the hydrated salt.

Formula of Mohr's Salt: $(NH_4)_2Fe(SO_4)_2.6H_2O$

Most abundant isotopes: $^{1}_{1}H$, $^{14}_{7}N$, $^{16}_{8}O$, $^{32}_{16}S$, $^{56}_{26}Fe$

A 144

B 204

C 284

D 360

E 374

F 392

2016

18 What volume of a 0.10 mol dm^{-3} solution of NaOH is needed to neutralise 30 cm^3 of a 0.20 mol dm^{-3} aqueous solution of a diprotic acid?

A 7.5 cm^3

B 15 cm^3

C 30 cm^3

D 60 cm^3

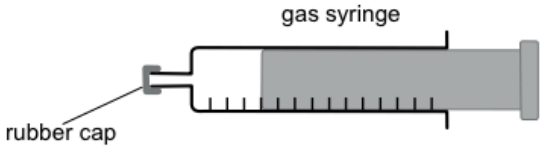
E 120 cm^3

2016

26 The gases X and Y react with each other to produce gas Z according to the equation:

$$2X(g) + Y(g) \rightarrow 2Z(g)$$

100 cm^3 of X was mixed with 10 cm^3 of Y, in a freely moving gas syringe sealed with a rubber cap. The reaction went to completion. All volumes were measured at the same temperature and pressure.



What is the final volume of gas in the syringe?

A 20 cm^3

B 55 cm^3

C 80 cm^3

D 100 cm^3

E 110 cm^3

F 120 cm^3

2016

26 The equation for the complete combustion of methane is:

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$$

If 1.60 g of methane were completely burned in 8.00 g of oxygen (an excess) to produce 4.40 g of carbon dioxide, what mass of oxygen is left unreacted?

(A_r: H = 1 ; C = 12 ; O = 16)

A 0.20 g

B 1.60 g

C 2.00 g

D 3.40 g

E 4.80 g

F 5.20 g

2015

18 An organic compound is found to contain 6 parts of carbon, 1 part of hydrogen and 8 parts of oxygen by mass.

6 g of a gaseous sample of the compound would have a volume of 2.4 dm^3 at room temperature and pressure.

Which formula (A–E) is the molecular formula for this compound?

(A_r: H = 1; C = 12; O = 16)

(1 mole of any gas occupies 24 dm^3 at room temperature and pressure)

A CH_2O

B $C_2H_4O_2$

C C_3H_8O

D $C_3H_6O_3$

E C_6HO_8

2014

10 1.15 g of sodium completely reacts with water at standard temperature and pressure (STP). What volume of hydrogen at STP is produced by this reaction?

[Assume in this question that 1 mole of any gas at STP has a volume of 22.4 dm^3 (litres).]

[A_r values: H = 1, O = 16, Na = 23]

A 280 cm^3

B 560 cm^3

C 600 cm^3

D 1120 cm^3

E 1200 cm^3

2013

18 An impure sample of sodium hydroxide has a mass of 1.20 g. All the sodium hydroxide completely reacts with a minimum of 50.0 cm^3 of 0.50 mol dm^{-3} hydrochloric acid.

What is the percentage purity of the sodium hydroxide sample?

[A_r values: H = 1; O = 16; Na = 23; Cl = 35.5]

A 37.5%

B 41.6%

C 72.7%

D 75.0%

E 83.3%

F 90.4%

2013

22 An ore of lead contains 70% of PbS.

Calculate the mass of lead that can be extracted from 478kg of the ore.

[A_r: Pb = 207; S = 32]

A 28.98kg

B 41.40kg

C 144.90kg

D 289.80kg

E 414.00kg

2011

2 2.74g of 1-bromobutane is reacted with excess aqueous sodium hydroxide to produce 1.11g of butan-1-ol according to the equation below.

$$C_4H_9Br + NaHO \longrightarrow C_4H_9OH + NaBr$$

What is the percentage yield of butan-1-ol?

(A_r : H = 1; C = 12; O = 16; Na = 23; Br = 80)

A 26%

B 40%

C 54%

D 75%

2012

2 A compound of iodine and oxygen contains 63.5g of iodine and 20.0g of oxygen.

Which of the following would be its formula?

(A_r : I = 127; O = 16)

A IO

B IO_2

C I_2O

D I_2O_3

E I_2O_5

F I_5O_2

2010

6 Carbon, in the form of coke, is used to reduce iron oxide in a blast furnace. The three stages are shown below:

1 $C + O_2 \rightarrow CO_2$

2 $CO_2 + C \rightarrow 2CO$

3 $3CO + Fe_2O_3 \rightarrow 2Fe + 3CO_2$

If 12g of carbon is used in stage 2 and all the carbon monoxide produced is used in stage 3, what mass of carbon dioxide is produced in stage 3?

(A_r : C = 12; O = 16)

A 17.8g

B 35.6g

C 44g

D 88g

E 132g

2010

22 A student prepared nitrobenzene by the following reaction.

$$\underset{\text{benzene}}{C_6H_6} + HNO_3 \rightarrow \underset{\text{nitrobenzene}}{C_6H_5NO_2} + H_2O$$

Starting with 3.9g of benzene, the student obtained 3.69g of nitrobenzene.

What is the percentage yield?

(A_r : H = 1; C = 12; N = 14; O = 16)

A 11%

B 53%

C 60%

D 95%

2010

10 2.00g of a carbon compound is burnt in excess oxygen.

4.77g of carbon dioxide is produced.

What percentage (to the nearest 1%) of carbon is in the original compound?

[A_r: C=12; O=16]

A 21%

B 26%

C 42%

D 52%

E 65%

2009

26 Naturally occurring chlorine is a mixture of two isotopes with mass number 35 and 37. The isotope with mass number 35 is three times as common as the isotope with mass number 37. Naturally occurring bromine is a mixture of two isotopes with mass numbers 79 and 81. They are present in equal amounts.

What fraction of the naturally occurring compound CH_2BrCl has a relative molecular mass of 128?

[A_r: H = 1; C = 12]

A $\frac{1}{8}$

B $\frac{1}{4}$

C $\frac{3}{8}$

D $\frac{1}{2}$

E $\frac{5}{8}$

2009