

Amount of substance – A2 2022 Chemistry P1&P3

1. *June/2022/Paper_7405/3/No.7*

Tschermigite is a hydrated, water-soluble mineral, with relative formula mass of 453.2

The formula of tschermigite can be represented as $M \cdot xH_2O$, where M represents all the ions present.

Table 4 shows its composition by mass.

Table 4

Element	% by mass
N	3.09
H	6.18
Al	5.96
S	14.16
O	70.61

In an analysis, it is found that the mineral contains the ions NH_4^+ , Al^{3+} and SO_4^{2-}

Calculate the empirical formula of tschermigite and the value of x in $M \cdot xH_2O$

Describe the tests, with their results, including ionic equations, that would confirm the identities of the ions present.

[6 marks]

2. June/2022/Paper_7405/3/No.9

Consider the change that occurs in the shape of the curve for the distribution of molecular energies in a gas when the temperature of the gas is increased.

Which is a correct statement about the gas molecules at a higher temperature?

[1 mark]

- A There are more molecules with any given energy.
- B There are more molecules with the mean energy.
- C There are more molecules with the most probable energy.
- D There is an increase in the most probable energy of the molecules.