Ionic structure and bonding in rubies: teacher guidance

These **In context** worksheets ask learners to use their knowledge of ionic structure and bonding in an applied context, building their confidence and capability to face exam questions. Calculation questions are included to give opportunities to practise mathematical skills within this topic. The worksheets are available at Foundation and Higher level and as fully editable versions, giving you the flexibility to select the questions most relevant to a particular lesson.

Also available to assess this topic:

* **Review my learning** **worksheets:** available with three levels of scaffolded support to help build confidence in every learner. Use before, during or after teaching the relevant topic to understand progress and identify misconceptions, **rsc.li/44igB7V**.
* **Knowledge check worksheets: select from Foundation and Higher level** to assess learners’ knowledge and understanding of this topic at the end of a period of teaching or as revision, **rsc.li/3RpKwpB**.

Answers

Foundation

* 1. **B** giant ionic
  2. **C** 3+
  3. electrostatic forces
  4. **D** 2000°C
  5. 30 oxide ions

|  |  |  |
| --- | --- | --- |
| **Element** | **Electronic configuration of atom** | **Electronic configuration of ion** |
| aluminium | 2, 8, 3 | **2, 8** |
| oxygen | 2, 6 | **2, 8** |

* 1. i. neon

ii. neon

* 1. i. *M*r  (2 × **27**) (3 ×**16**)

**54** **48**

**102**

ii. of Al in  × 100

**52.9**

* 1. Mass of aluminium in ruby crystal × 0.20

0.11 g

* 1. Mass of chromium(III) oxide × 0.20

0.0001 g or 1 × 10‒4 g

Higher

* 1. giant ionic
  2. i. 3+

ii. 2–

* 1. An empirical formula for a giant ionic structure gives the ratio of the ions in the structure.

|  |  |  |
| --- | --- | --- |
| **Element** | **Electronic configuration of an atom** | **Electronic configuration of an ion** |
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| oxygen | **2, 6** | **2, 8** |

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Two aluminium ions shown as two separate circles containing the symbol Al enclosed within square brackets with a three plus written at the top right corner on the outside of the right hand bracket. 
Next to the two Al ions are three oxide ions drawn as three circles containing the symbol O enclosed within square brackets and a two minus at the top right corner on the outside of the right hand bracket. Each circle has six dots and two crosses drawn onto it

(a) *M*r

54 48

102

(b) by mass of Al in × 100

52.94

(c) 1 mol Al2O3 102 g

0.20 g mol

0.002 mol

(d) 1 mol aluminium ions contains 6.02 × 1023 ions

0.05 mol aluminium ions contains 0.05 × (6.02 × 1023) ions

3.01 x 1022 ions

(a)mass of chromium oxide × 0.20

0.0001 g or 1 × 10–4 g

* 1. *M*r (2 × 52) + (3 × 16)

104 48

152

by mass Cr in  × 100

68.42

mass of chromium × (1 × 10‒4)

6.84 × 10‒5 g