

92023



Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Chemistry and Biology RAS 2023

92023 Demonstrate understanding of the physical properties of materials in the taiao

SAMPLE ASSESSMENT

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Describe the physical properties of materials in the taiao.	Explain the macroscopic physical properties of materials in the taiao.	Relate understanding of physical properties of materials in the taiao to interactions between submicroscopic particles.

Check that this booklet has pages 2–5 in the correct order and that none of these pages is blank.

This assessment is based on a now-expired version of the achievement standard and may not accurately reflect the content and practice of external assessments developed for 2024 onwards.

EXAMPLE QUESTION: BUILDING A TINY HOUSE

<https://www.designboom.com/architecture/baluchon-tiny-house-ala-kol-11-17-2020/>

A tiny house is a small building. This tiny house has aluminium covering the walls and the roof, as shown in the picture. The tiny house is on a steel trailer so it can be easily moved.

When building the tiny house, the type of chemicals used need to be considered.

Part A

- (a) Two metals that could be used to for the roof and walls of the tiny house are aluminium and copper. Table 1 gives three physical properties of the two metals.

Table 1

Physical Properties of Aluminium and Copper			
Metal	Density g/cm³	Melting Point °C	Malleability Moh
Aluminum	2.71	660	2
Copper	8.94	1084	3

Note: A more malleable metal has a lower Moh value.

Referring to Table 1 above, discuss why the builders chose aluminium over copper for the walls and roof of the tiny house.

- (b) A tiny house can be moved by building the house on a trailer. Two metals that could be used are steel and iron. Table 2 gives three physical properties of steel and iron.

Table 2

Physical Properties of Steel, Iron and Aluminium			
Metal or alloy	Density g/cm³	Melting Point °C	Malleability Moh
Steel (Iron with carbon)	7.84	1425 to 1540	5.5
Iron	7.86	1538	4

Note: A more malleable metal has a lower Moh value.

Steel, an alloy of iron and carbon can be used for the tiny house trailer.




Explain what an alloy is.

Use the information in the table above to discuss the choice of steel instead of iron for the tiny house trailer.

Part B

Some of the tools used to build the tiny house are shown in the pictures below.

(a) For each tool identify the main type of chemical shown.

Tool	 <p>https://diamond-tools.co.nz/products/porcelain-and-ceramic-tile-blades-continuous-rim</p>	 <p>https://www.kidde.com/fire-safety/en/ca/products/fire-extinguishers/468030mtl/</p>	 <p>https://www.familyhandyman.com/list/how-to-use-a-chalk-line-2/</p>
Description	Diamond -rimmed saw blade	Carbon dioxide in the fire extinguisher	Calcium carbonate chalk line use to mark a straight line before cutting

(a) For each tool, classify the type of chemical included in their description above into: **ionic**, **metallic**, **covalent network**, or **molecular**.

Diamond: _____

Carbon dioxide: _____

Calcium carbonate: _____

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