Name: _____

Medicine Bow Field Station

Molecules and crystals

The field station crew needs models for its sample collection. Use the composition cards to show how each sample is put together.

Keep first answers. Add one retry beside them in another color after a hint.

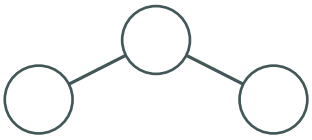
1. Build a water molecule

A water molecule has one oxygen atom joined to two hydrogen atoms.

Fill all three positions to model one water molecule. Use Figure 1.

H = hydrogen • O = oxygen

Figure 1. Water model



2. Repair a carbon dioxide molecule

A carbon dioxide molecule has one carbon atom joined to two oxygen atoms. Each oxygen joins the carbon.

The starter model has the right atom counts. Change the positions so both oxygen atoms join the carbon. Use Figure 2.

C = carbon • O = oxygen

Figure 2. Carbon dioxide model



3. Extend a rock salt crystal

Rock salt contains sodium and chloride particles. Chloride is the form of chlorine in salt. Na and Cl identify the elements in this slice.

Complete the three empty positions in the last column. Use Figure 3.

Element symbols - Na = sodium • Cl = chlorine

Figure 3. Rock salt model

Na	Cl	Na	
Cl	Na	Cl	
Na	Cl	Na	

First-try model tally: ____ / 3 After-feedback model tally: ____ / 3

Next: use Figures 2 and 3 on this page for the comparison on page 2. The complete practice tally also includes the comparison grid and the sentence.

Lines in molecule drawings show which positions join. Crystal drawings show a flat slice of a continuing pattern. Element symbols identify the elements; charges and exact molecular angles are omitted.

Compare the models

Keep Figures 2 and 3 on page 1 beside this page.

Name: _____ Date: _____

Compare Figure 2, the carbon dioxide model, with Figure 3, the rock salt model.

4a. For each description in Table 1, select every model that matches. Use Figures 2 and 3.

Select all that match in each row; a row may have more than one check.

Table 1. Model descriptions

Description	Carbon dioxide	Rock salt
Shows one separate molecule.	☐	☐
Shows part of a pattern that can keep repeating.	☐	☐
Contains more than one kind of element.	☐	☐

First try: mark the grid. Try again: list corrections here: _____

4b. Complete the explanation using Figures 2 and 3.

The carbon dioxide model _____ (1); the rock salt model _____ (2).

Menu 1: write one letter

A. keeps repeating in every direction
B. ends after three joined atoms
C. contains only one kind of element

Menu 2: write one letter

A. shows a pattern that can keep repeating
B. ends after one separate molecule
C. contains only one kind of element

First-try menu letters: _____ Try-again menu letters: _____

Complete practice tally: First try ____ / 5 After feedback ____ / 5

Keep first answers. For a grid retry, leave original marks visible and list the row and corrected model names on the retry line. Your teacher gives one matching hint before the retry.

Exit question

Student code: _____ Ask your teacher for your code.

The field station receives two new samples. Use their composition cards to finish the models.

Work on your own. Use Figures 4 and 5. You may leave a part blank if you are not sure.

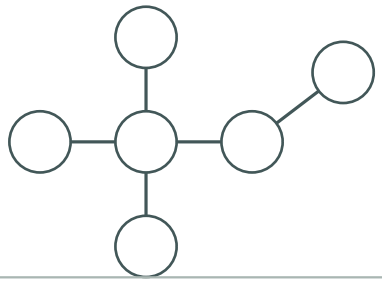
A. Build a methanol molecule

One methanol molecule has one carbon atom, one oxygen atom and four hydrogen atoms. Carbon joins three H atoms and the O atom. Oxygen joins carbon and the remaining H atom.

Use all six positions to model one methanol molecule. Use Figure 4.

H = hydrogen • C = carbon • O = oxygen

Figure 4. Methanol model



B. Extend a magnesium oxide crystal

This flat slice of a magnesium oxide crystal shows magnesium (Mg) and oxygen (O).

Use the part shown to fill both empty positions. Use Figure 5.

Element symbols - Mg = magnesium • O = oxygen

Figure 5. Magnesium oxide model

Mg	O	Mg	O
	Mg	O	Mg
Mg	O		O

C. Use the crystal model as evidence

A student calls each neighboring Mg and O pair in Figure 5 a separate molecule. Using only the given, filled positions, which two structural observations together best challenge that claim?

Select two correct answers.

- ☐ A. One Mg has several neighboring O positions.
- ☐ B. The pattern uses both Mg and O element symbols.
- ☐ C. The pattern ends as separate two-particle groups.
- ☐ D. A pattern extends through several rows and columns.
- ☐ E. Each Mg has exactly one neighboring O position.

Models use element symbols. Charges and exact molecular angles are omitted.