Physical Science: Chemistry

Two practice sessions per week, followed by one new retrieval check.

Name _____ **Date** _____

Week 1 / Follow atoms through a model + Temperature and the system boundary

Work the two exercises on the corresponding week's sheet. Then put your notes away and answer this check.

In a closed model, $2H_2$ combines with $1O_2$. How many H and O atoms must appear among the products?

Week 2 / Link a model to conductivity + Interpret a reaction-rate curve

Work the two exercises on the corresponding week's sheet. Then put your notes away and answer this check.

Equal amounts react in 80 s or 50 s to the same endpoint. Why does the shorter time indicate a higher average rate?

Week 3 / Read a reversible change + Choose a model with evidence

Work the two exercises on the corresponding week's sheet. Then put your notes away and answer this check.

A solid conducts and bends easily. Give a particle model consistent with each observation.

Bridge rehearsal

Two materials each absorb 100 J but provide different temperature drops in different water masses. Can drop alone reveal the better material?

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SESSION 1

Follow atoms through a model

A closed model begins with four H_2 molecules and two O_2 molecules. Every available molecule reacts to form H_2O. Draw or describe the before and after particles. Identify the conserved quantities and one quantity that changes.

Start here if you were away. Count H and O atoms separately before drawing.

SESSION 2

Temperature and the system boundary

Two solutions initially at 20 °C are mixed in an insulated cup. The mixture rises to 27 °C. Mixing the same volumes of water as a comparison stays near 20 °C. Define the reacting chemicals as the system. Explain the direction of energy transfer and the role of the comparison.

Start here if you were away. Draw the system boundary around the reacting chemicals and label the surroundings.

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SESSION 3

Link a model to conductivity

Samples X and Y are each tested as a solid and dissolved in water. X conducts only when dissolved. Y conducts in neither condition. Assume both dissolve. Propose a particle model for X, compare it with a possible model for Y, and name an observation that would strengthen your explanation.

Sample	Solid	In water
X	No conduction	Conducts
Y	No conduction	No conduction

Start here if you were away. Ask whether charged particles can move in each condition.

SESSION 4

Interpret a reaction-rate curve

Each gas collector starts at 0 mL and finishes at 40 mL. At 20 seconds a room-temperature trial has 14 mL and a warmer trial has 25 mL. Reactant amounts are equal. Compare initial-interval average rates and explain the difference using collisions.

Start here if you were away. Compute each change from 0 mL during the same 20 seconds.

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SESSION 5

Read a reversible change

At constant temperature a closed mixture has $N_2O_4(g) \rightleftharpoons 2NO_2(g)$. At equilibrium more NO_2 is suddenly added without changing volume. Predict the initial net direction after addition and what is true of the two rates once a new equilibrium is reached.

Start here if you were away. Identify which side just gained particles.

SESSION 6

Choose a model with evidence

A sealed sample of solid goes from ordered particles at −2 °C to mobile particles in contact at +3 °C. During heating its temperature pauses near 0 °C while both phases are present. Classify the change and explain where added energy goes during the pause. Identify an observation that would challenge your model.

Start here if you were away. Compare particle identity, spacing and movement across the change.