

Matter Detective Notes

Read closely to trace atoms, changes, and dissolving.

7.6 "Matter and energy. The student distinguishes between elements and compounds, classifies changes in matter, and understands the properties of solutions..."

NAME _____ DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline every chemical symbol or chemical formula. Circle each sentence that explains a physical or chemical change, then number the three conditions that can make a solid dissolve faster.

Atoms, Changes, and Salt Water

- ① Materials can be described by the atoms they contain. An element is made of one kind of atom and is shown by a chemical symbol, such as Fe for iron. Some elements also occur as molecules made of only one kind of atom. A compound contains atoms of two or more elements chemically joined in fixed proportions. Its chemical formula uses symbols and subscripts. In CO₂, one carbon atom and two oxygen atoms form each molecule. The periodic table tells the names of C and O. A missing subscript means one atom.
- ② A physical change alters form, state, or size but does not create a new substance. Melting ice and crushing a salt crystal are physical changes. A chemical change forms one or more new substances. When iron reacts with oxygen and becomes rust, its atoms are rearranged into a different substance. In an aqueous solution, water is the solvent. A dissolved substance, such as salt, is the solute. A concentrated solution has more solute in a given amount of solution than a dilute solution. Adding water dilutes it.
- ③ To dissolve a solid solute faster in water, change conditions that increase contact between water and the solid. Warmer water usually dissolves many solids faster because particles move more quickly. Crushing a cube into smaller pieces increases surface area exposed to water. Stirring, or agitation, brings fresh water to the solid's surface. These conditions can change the rate of dissolving. Temperature can also change how much of some solid dissolves in a certain amount of water. In a fair test, change only one factor while keeping the solute mass, water volume, and other conditions the same.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 How does Fe represent matter differently from CO₂?

2 Use the periodic table information in the passage to identify the elements and number of atoms in one molecule of CO₂.

3 Classify crushing a salt crystal and iron becoming rust as physical or chemical changes. Explain each classification.

4 In salt water, identify the solvent and solute. What happens to concentration when water is added, and name one condition that can make salt dissolve faster?

3 YOUR TURN _____ Your own words

Plan three fair tests to investigate how temperature, surface area, and agitation affect the time salt takes to dissolve in water. For each test, state the comparison, what you will keep the same, and what you will measure.

FACTOR CHANGED	COMPARISON	KEEP THE SAME	MEASURE

PART 1 • READ AND MARK

Underline every chemical symbol or chemical formula. Circle each sentence that explains a physical or chemical change, then number the three conditions that can make a solid dissolve faster. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How does Fe represent matter differently from CO ₂ ?	Fe is the chemical symbol for the element iron. CO₂ is a chemical formula for a compound made of carbon and oxygen atoms.
2	Use the periodic table information in the passage to identify the elements and number of atoms in one molecule of CO ₂ .	CO₂ has 1 carbon atom, C, and 2 oxygen atoms, O.
3	Classify crushing a salt crystal and iron becoming rust as physical or chemical changes. Explain each classification.	Crushing a salt crystal is a physical change because only its size changes. Rusting is a chemical change because a different substance forms.
4	In salt water, identify the solvent and solute. What happens to concentration when water is added, and name one condition that can make salt dissolve faster?	Water is the solvent, and salt is the solute. Adding water dilutes the solution, making it less concentrated. Warmer water, crushing the salt, or stirring can increase the rate of dissolving.

PART 3 • YOUR TURN (SAMPLE ANSWER)

FACTOR CHANGED	COMPARISON	KEEP THE SAME	MEASURE
Temperature	40 °C water compared with 20 °C water	same salt type and mass, water volume, particle size, and agitation	time until the salt disappears
Surface area	crushed salt compared with coarse salt	same salt type and mass, water volume, temperature, and agitation	time until the salt disappears
Agitation	stirred water compared with unstirred water	same salt type and mass, water volume, particle size, and temperature	time until the salt disappears

Accept equivalent wording that correctly distinguishes symbols from formulas, identifies atom counts, and explains whether a new substance forms. In the investigation plan, each row must change only the named factor and identify valid controls and a measurable dissolution time.