Reversible and irreversible changes: a card sort and a rusting test

Name: _____ Class: _____ Date: _____

Cut out the twelve cards at the bottom of this page. With a partner, sort them on your desk into two groups: changes where you can get the material back, and changes that make new substances. Then write each card's letter in the right box, and answer the questions.

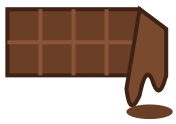
Reversible — You can get the material back	**Irreversible** — New substances are made

1. Which card was hardest to sort? Why?

2. What question did you ask yourself to decide where each card went?

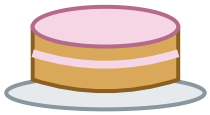
Cut along the dashed lines

A



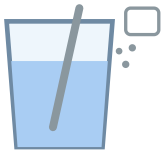
Chocolate melting in a warm hand

B



A cake baking in the oven

C



Salt dissolving in water

D



Paper burning

E



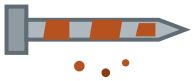
Water boiling into steam

F



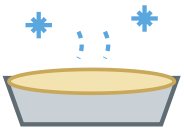
An egg boiling

G



A nail rusting

H



Melted wax setting as it cools

I



A banana turning brown

J



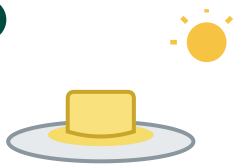
Drops forming on a glass of iced water

K



A candle burning

L

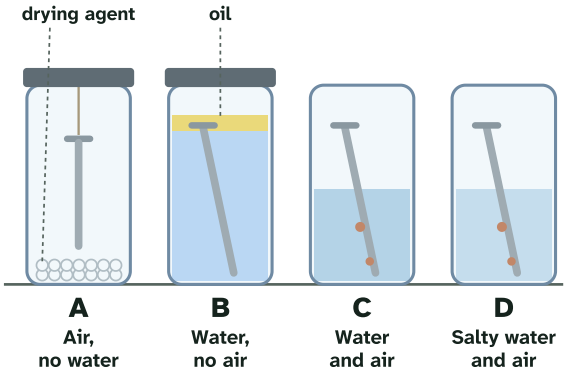


Butter melting on a hot day

PRACTICAL What makes iron rust? A fair test

Aim: To find out what iron needs to rust, with a fair test that changes one thing at a time.

Each group needs: four clean glass jars, two with lids, labelled A to D; four shiny steel nails that aren't galvanised or painted; string; tap water; water that your teacher has boiled and let cool; cooking oil; salt and a teaspoon; a drying agent, such as calcium chloride, which your teacher will put in; a magnifying glass.



Safety. Your teacher boils the water and puts in the calcium chloride, wearing gloves and eye protection. Studyladder's worksheet says: "Use gloves when handling calcium Chloride." Nails can be sharp. Don't taste anything, including the salty water, and wash your hands when you finish.

1. Your teacher puts a spoonful of the drying agent in the bottom of jar A. Tie string round a nail and hang it in jar A so that it doesn't touch the drying agent, then screw the lid on tightly over the string to hold it and keep the air dry.
2. Put a nail in jar B, and your teacher will gently pour in cooled boiled water to cover it. Boiling removes the oxygen dissolved in the water. Straight away, pour a layer of oil on top to stop air dissolving into the water again, and put the lid on.
3. Put a nail in jar C and add tap water until it covers half the nail. Leave the lid off.
4. Stir a teaspoon of salt into a cup of tap water. Put a nail in jar D and add the salty water until it covers half the nail. Leave the lid off.
5. Put the jars where they won't be bumped. Look at each nail with the magnifying glass after 1, 3 and 7 days, and write what you see in the table. School rusting tests are usually left for a week or two.

Jar	What the nail has	Day 1	Day 3	Day 7
A	**Air, no water**			
B	**Water, no air**			
C	**Water and air**			
D	**Salty water and air**			

1. Which nails rusted? Which one rusted most?

2. Which two jars test whether iron needs water to rust? Why do you need those two?

3. Which two jars test whether iron needs air to rust?

4. Look at the rust through the magnifying glass. Write two ways it is different from the iron.

5. Can drying the nail turn the rust back into iron? What kind of change is rusting? Explain.