

1. Background:

Physical Change
PHYSICAL CHANGE OF WATER INTO ICE

Liquid H₂O changes to solid H₂O

Chemical Change
CHEMICAL CHANGE OF WATER INTO HYDROGEN PEROXIDE

Water takes a 2nd atom of Oxygen and changes to H₂O₂ (hydrogen peroxide).

- a) In a P _____ CHANGE, the same substance is changed to dif _____ form.
 b) In a C _____ CHANGE one or more new subs _____ are formed.

2. Know the Law of Conservation of Matter and Energy. Fill in the blanks.

- a) In a chemical reaction (change), matter and/or **energy is neither created nor destroyed.**
 b) The TOTAL mass and energy stays the _____, but can change its form.
 c) Energy is either **absorbed and stored** (as in a tree) or **released** (as in heat from the wood burning.)
 Energy is either ↑e _____ or ↑e _____

3. CHECK LIST. USE this Check List in #3 to fill in the chart in #4 below.

Physical Changes	Chemical Changes
_____ Same substance as before	_____ New substance(s) formed
_____ May be in different form or shape	_____ Energy absorbed or given off (often as heat)
_____ May include change of state (S-L-G)	_____ Usually includes light or heat change
_____ Usually no color change	_____ May include color change
_____ Usually easily reversed	_____ Not easily reversed
_____ Not described by chemical equation	_____ Described by chemical equation

4. Fill in the Change chart below, using the Check List reasons from #3 above.


- Write (P) Physical or (C) Chemical for the following changes.
- Write the **bold words** from at least one ↑ reason in #3 for each example.

Change:	P or C?	Write 1 reason from #3 above:
a) Breaking glass or melting glass		
b) Burning anything (requires oxygen)		
c) Melting ice or melting lead		
d) Freezing, melting, evaporating, boiling, and/or condensation of H ₂ O.		
e) Dissolving salt (NaCl) in water (H ₂ O)		
f) Fe (iron) + O (oxygen) → Fe ₂ O ₃ (rust)		
g) Letting dissolved carbon dioxide (CO ₂) out of soda pop		
h) Vinegar (Acetic Acid) + baking soda (NaCO ₃) → H ₂ O + Carbon dioxide (CO ₂)		
i) H (hydrogen) + O (oxygen) → H ₂ O (water vapor) + released energy (heat)		
j) H ₂ O ₂ → H ₂ O + O ₂ (hydrogen peroxide → water + oxygen)		
k) Sugar from chlorophyll in plants + sunlight Sugar then used for energy		

1. Use Iodine and COLOR CHANGE to TEST FOR STARCH in substances.

!! SAFETY ALERT: IODINE STAINS and is POISONOUS!



- __a) Use a dry dish, pan or plate.
- __b) Place about a cubic centimeter (cm)  or less of each substances **like numbers on a clock, around the of the dish or pan**. Use 1) cornstarch, 2) salt, 3) sugar, 4) paper towel, 5) thin paper, 6) thicker paper 7) Styrofoam, 8) soluble packing peanut, 9) water, 10) ??
- __c) In the center, ASK for enough iodine solution to make a puddle about the size of a penny.
- __d) **Keep substances separate** as you use a toothpick or stirring straw tip to move a little iodine to each substance, **ONE AT A TIME**.
- __e) OBSERVE and RECORD resulting color for EACH substance.
- __f) Always clean up **according to directions**. IF NOT SURE, ASK.

→ IODINE is to be rinsed down the CLEANUP SINK or put in wastebasket. Your table should be rinsed & cleaned.

Substance	Resulting Color	Physical or Chemical Change?
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

__g) From your data, IODINE _____ in STARCH

Clean up! Have Checked:

2. CHEMICAL CHANGE TO CHANGE A SUBSTANCE AND CLEAN a Penny.



- __a) Use a small plastic dish. RINSE before using. Rinse after soap.
- __b) Try a small amount of each of the following, in order, to clean a penny.
- __c) Observe and record to fill in the chart.

Substance for cleaning	Describe Change ↓	Change: Physical or Chemical?	Reason from Chemical Changes Worksheet
Water			
Soap and water Rinse after!			
Vinegar			
Vinegar and salt If time, Save this liquid for 3.			

Clean up Have Checked

3. Chemical Change to copper plate (add a coating of copper) an object made of iron.



- __a) Use the vinegar and salt mixture from above, or make more.
- __b) Use steel wool to break up the finish on a paperclip (or nail) that is made using iron.
- __c) Add 2-4 copper pennies (1981 or older) in your vinegar and salt mixture.
- __d) Add your paperclip. If you want to compare the change, leave part of it out of the liquid.
- __e) Let sit, checking every 5 minutes. If needed, mark with your name and period and **ask where**.
- __f) **Draw and describe the results here:**

Time in solution: _____
Describe results:

Draw results:

This involves **two chemical reactions**: 1. The copper first combines with the acetic acid (vinegar).
2. Copper is then attracted to the iron and leaves the acid to stick to the iron.

__g) **Rinse and dry your pennies and paperclip or nail.**

Have Checked