

# Grade Five Core Unit Matter and Its Changes

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# Core Unit

## Grade 5

### Physical and Chemical Properties of 4 different crystals

#### Lab. # 1

#### **Objective: 2.1, 2.2, 2.3**

To study the physical and chemical properties of four different crystals.

#### **Equipment:**

4 crystals - Crystal #1 - coal, Crystal #2 - potassium permanganate, Crystal #3 - sugar, Crystal #4 - sulfur  
2 beakers with hot water  
Tin spoon  
Bunsen burner

#### **Procedure:**

1. Observe and write down the four different crystals under the headings:  
Crystal #1, Crystal #2, Crystal #3, Crystal #4.
2. List all the physical properties by using sight and feel. Leave a line, observe and write down the chemical properties of the four crystals after putting Crystals #1 & 2 in beakers of water.
3. Put Crystals #3 & 4 on tinfoil and hold over the bunsen burner's cool flame.
4. Create a diagram labeling the following: bunsen burner, beaker, water, tinfoil, test tube holder, crystal #1, #2, #3, #4

#### **Observations:**

Crystal #1 - Mix with water

Crystal #2 - Mix with water

Crystal #3 - Burn on a spoon using a bunsen burner

Crystal #4 - Burn on a spoon using a bunsen burner

#### **Conclusions:**

1. How are an object's physical properties different from the object's chemical properties?
2. Choose any three things found around you and describe one physical property and one chemical property of each.

*Student's Activity Sheet*

**Core Unit**  
**Grade 5**  
**Matter and Its Changes**  
**Lab. # 1**

**Objective:**

To study the physical and chemical properties of four different crystals.

**Equipment:**

4 crystals - Crystal #1 - coal  
Crystal #2 - potassium permanganate  
Crystal #3 - sugar  
Crystal #4 - sulfur  
2 beakers with hot water  
Tin spoon  
Bunsen burner



**Procedure:**

Observe and write down the four different crystals under the headings: Crystal #1  
Crystal #2, Crystal #3, Crystal #4.

List all the physical properties by using sight and feel. Observe and write down the chemical properties of the four crystals after putting Crystals #1 & 2 in beakers of water. Put Crystals #3 & 4 on tinfoil and hold over the bunsen burner's cool flame.

Create a diagram labeling the following: bunsen burner, beaker, water, tinfoil, test tube holder, crystal #1, #2, #3, #4

**Observations:**

	<b>Physical Properties</b>	<b>Chemical Properties</b>
Crystal #1 mixed with water		
Crystal #2 mixed with water		
Crystal # 3 burned		
Crystal #4 burned		

**Conclusions:**

1. How are an object's physical properties different from the object's chemical properties?

2. Choose any three things found around you and describe one physical property and one chemical property of each.

<b>Object</b>	<b>Physical Property</b>	<b>Chemical Property</b>

# Core Unit

## Grade 5

Physical & chemical properties of atoms & molecules

Lab. # 2

### Demonstration

#### **Objective:**

To learn more about the terms: physical and chemical properties.

To be able to understand the terms atom, molecule, and chemical formula.

#### **Equipment:**

1. Ammonium dichromate (30 ml)
2. test tube
3. bunsen burner
4. test tube holder

#### **Procedure:**

Look at the ammonium dichromate in the test tube and write down its physical properties:

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Hold the test tube over the flame of the bunsen burner. Write down the chemical properties of the ammonium dichromate.

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The following chemical equation tells what happened:



**Diagram:**

test tube  
test tube holder  
bunsen burner  
ammonium dichromate  
nitrogen  
water  
chromate

**Conclusion:**

1. What element caused the solid to shoot out of the test tube?
2. Name only one type of atom used in the above lab.
3. Name one molecule that contains two atoms.
4. \_\_\_\_\_ are the smallest units of matter in our world.
5. All matter in our world is made up of \_\_\_\_\_.
6. A pure element is made up of only \_\_\_\_\_ type of atom.
7. Any matter that is made up of more than one atom is called a \_\_\_\_\_.
8. There are \_\_\_\_\_ pure elements that we know of in our world today.
9. From the experiment we have just done, name a

Solid \_\_\_\_\_

Liquid \_\_\_\_\_

Gas \_\_\_\_\_

*Student Activity Sheet*

**Core Unit**  
**Grade 5**  
**Matter and Its Changes**  
**Lab. # 2**  
**Demonstration**

**Objective:**

To learn more about the terms: physical and chemical properties.

To be able to understand the terms atom, molecule, and chemical formula.

**Equipment:**

1. Ammonium dichromate (30 ml)
2. test tube
3. bunsen burner
4. test tube holder

**Procedure:**

Look at the ammonium dichromate in the test tube and write down its physical properties:

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Hold the test tube over the flame of the bunsen burner. Write down the chemical properties of the ammonium dichromate.

---

---

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The following chemical equation tells what happened:



Diagram:

test tube

test tube holder

bunsen burner

ammonium dichromate

nitrogen

water

chromate

**Conclusion:**

1. What element caused the solid to shoot out of the test tube?
2. Name one type of atom used in the above lab.
3. Name one molecule that contains two atoms.
4. \_\_\_\_\_ are the smallest units of matter in our world.
5. All matter in our world is made up of \_\_\_\_\_.
6. A pure element is made up of only \_\_\_\_\_ type of atom.
7. Any matter that is made up of more than one atom is called a \_\_\_\_\_.
8. There are \_\_\_\_\_ pure elements that we know of in our world today.
9. From the experiment we have just done, name a  
Solid \_\_\_\_\_  
Liquid \_\_\_\_\_  
Gas \_\_\_\_\_

# Core Unit

## Grade 5

### Physical & Chemical Changes of 6 different kinds of cloth

#### Lab. # 3

(Burning properties)

#### Objective: 2.2, 2.3

To study the physical and chemical (burning) properties for six different kinds of cloth.

#### Procedure

1. Equipment:
  2. Candle
  3. Test tube holders
  4. Cloth :
    - 100% wool
    - 100% cotton
    - 100% nylon
    - 100% linen
    - 100% silk
    - 100% polyester
1. Take each material, one at a time, and OBSERVE them for their physical properties.
  2. Burn the materials by placing it in the candle's flame. The material should be held with the test tube holders. OBSERVE what chemical properties each material has

#### Observation

Put your observations on the chart given to you.

Diagram:

- candle
- test tube holder
- six fabric samples:
  1. wool
  2. cotton
  3. nylon
  4. linen
  5. silk
  6. polyester

## Conclusion

1. Name the three pairs of material that have similar chemical properties.

Pair #1		and	
Pair #2		and	
Pair # 3		and	

2. Fifty years ago there were only natural materials such as wool, cotton, linen and silk. But scientists can now rearrange molecules to create new materials. Name two items that you know about that are using scientifically altered molecules to make new form of matter. Also tell one property of this new matter.

*Student Activity Sheet*

## Core Unit

### Grade 5

Physical & Chemical Changes of 6 different kinds of cloth

Lab. # 3

(Burning properties)

### **Objective**

To study the physical and chemical (burning) properties for six different kinds of cloth.

### **Procedure**

1. Equipment:
2. Candle
3. Test tube holders
4. Cloth :
  - 100% wool
  - 100% cotton
  - 100% nylon
  - 100% linen
  - 100% silk
  - 100% polyester

### **Observation:**

Take each material, one at a time, and OBSERVE them for their physical properties.

Burn the materials by placing it in the candle's flame. The material should be held with the test tube holders. OBSERVE what chemical properties each material has.

Record your observations on the chart.

<b>Materials</b>	<b>Physical Properties</b>	<b>Chemical Properties</b>
Wool		
Cotton		
Nylon		
Linen		
Silk		
Polyester		

## **Conclusion**

1. Name the three pairs of material that have similar chemical properties.

Pair #1		and	
Pair #2		and	
Pair # 3		and	

2. Fifty years ago there were only natural materials such as wool, cotton, linen and silk. But scientists can now rearrange molecules to create new materials. Name two items that you know about that are using scientifically altered molecules to make new form of matter. Also tell one property of this new matter.

<b>Material</b>	<b>Property</b>

# Core Unit

## Grade 5

### Liquids

#### Lab. # 4

#### **Objective: 1.3, 1.4, 1.5**

To observe how certain liquids have a greater attraction within their molecules than others do.

#### **Equipment:**

4 test tubes  
test tube holder  
4 corks  
gas, oil and water

#### **Procedure:**

Test whether or not the molecular attraction in each liquid is stronger or weaker when put with a different liquid. **DO NOT SHAKE.** Tip the test tube upside down and then right side up ONCE. **DO NOT SHAKE.**

Water mixed with gas  
Water mixed with oil  
Oil mixed with gas

#### **Observation:**

Watch what liquids mix with others and also which liquids are on top and which are on the bottom.

#### Diagram:

Test tube  
Stopper  
Gasoline  
Test tube holder  
Water  
Oil

#### **Conclusion:**

1. In which test or tests was the attraction between the different molecules the strongest? They wanted to be together.
2. In which test or tests was the attraction between the different molecules the weakest? They didn't want to be together.
3. Why do certain molecules want to bond only with specific types of molecules and not just any molecule that is available?

*Student Activity Sheet*

**Core Unit**  
**Grade 5**  
**Liquids**  
**Lab. # 4**

**Objective**

To observe how certain liquids have a greater attraction within their molecules than others do.

**Equipment:**

4 test tubes  
test tube holder  
4 corks  
gas, oil and water

**Procedure:**

Test whether or not the molecular attraction in each liquid is stronger or weaker when put with a different liquid. **DO NOT SHAKE.** Tip the test tube upside down and then right side up ONCE. **DO NOT SHAKE.**

Water mixed with gas  
Water mixed with oil  
Oil mixed with gas

**Observation:**

Watch what liquids mix with others and also which liquids are on top and which are on the bottom.

Diagram:

Test tube  
Stopper  
Gasoline  
Test tube holder  
Water  
Oil



**Conclusion:**

1. In which test or tests was the attraction between the different molecules the strongest? They wanted to be together.
  
2. In which test or tests was the attraction between the different molecules the weakest? They didn't want to be together.
  
3. Why do certain molecules want to bond only with specific types of molecules and not just any molecule that is available?

**Core Unit**  
**Grade 5**  
Three states of matter  
Lab. # 5

**Objective: 2.6, 2.7**

To learn about the three different states of matter.

NOTE: This lab works only if the humidity is high.

**Equipment:**

beaker of water  
350 mil of ammonium nitrate  
stir stick

**Procedure:**

WARN STUDENTS NOT TO TOUCH THE CHEMICAL OR SPLASH THE WATER!

Place the ammonium nitrate into the beaker filled with water. There should be an equal amount of water and ammonium nitrate mixed together.

**Observation:**

OBSERVE what happens on the outside of the beaker.

Diagram: draw a diagram of the above equipment as it should be set up and label all parts of the diagram.

**Conclusion:**

The ammonium nitrate will react with the water. The water will drop dramatically in temperature. Dew will form on the outside of the beaker and may even turn into frost.

- a.) What is one physical property of ammonium nitrate?
- b.) What are two chemical properties of ammonium nitrate?
- c.) All matter in our world is made up of \_\_\_\_\_.
- d.) What is the chemical formula for water?
- e.) Write down the names of three elements and put their chemical symbols beside each name.
- f.) What state of matter is the water in?
- g.) What state of matter is the ammonium nitrate in?
- h.) What formed on the outside of the beaker? two names
- i.) What state of matter was this substance in before it formed on the outside of the beaker?
- j. Tell how molecules move when in each of the three different states of matter. *Research!*

*Student Activity Sheet*

## Core Unit

### Grade 5

#### Three states of matter

#### Lab. # 5

#### **Objective:**

To learn about the three different states of matter.

#### **Equipment:**

beaker of water  
350 mil of ammonium nitrate  
stir stick

#### **Procedure:**

**DO NOT TOUCH THE CHEMICAL OR SPLASH THE WATER!**

Place the ammonium nitrate into the beaker filled with water. There should be an equal amount of water and ammonium nitrate mixed together.

Diagram: Draw a diagram of the above equipment as it should be set up and label all parts of the diagram.

#### **Observation:**

OBSERVE what happens on the outside of the beaker.

#### **Conclusion .**

#### Questions:

a.) What is one physical property of ammonium nitrate?

b.) What are two chemical properties of ammonium nitrate?

c. ) All matter in our world is made up of \_\_\_\_\_.

d. ) What is the chemical formula for water?

e. ) Write down the names of three elements and put their chemical symbols beside each name.

f.) What state of matter is the water in?

g.) What state of matter is the ammonium nitrate in?

h.) What formed on the outside of the beaker? two names

i.) What state of matter was this substance in before it formed on the outside of the beaker?

j. Tell how molecules move when in each of the three different states of matter. *Research!*

**Core Unit**  
**Grade 5**  
**Matter and Its Changes**  
**Lab. # 6**  
**Using the ph scale**

**Objective:**

To learn to use the ph scale correctly.

**Procedure:**

Equipment

10 elements  
One beaker filled with water  
One eye dropper  
Container of ph paper

Directions:

Take each of the following elements one at a time and test each to see if it is acidic, alkaline or neutral. Wash the eye dropper after each element is tested to make sure that the tests are true.

**Observation:**

Element	ph reading	Acid or Base
vinegar	3, 4	acid
lemon juice	3, 4	acid
baking soda in water	8	alkaline or base
tomato juice	4, 5	acid
salt water	5, 6	acid
sodium bicarbonate in water	8,9	alkaline, base
sodium biphosphate in water	5	acid
boron in water	4, 5	acid
sugar in water	5	acid
ammonia	10, 11	alkaline, base

**Conclusion:**

1. Draw a diagram of the ph scale.
2. What problem are Saskatchewan farmers having that may be solved if we can understand the ph process better?

*Student Activity Sheet*  
**Core Unit**  
**Grade 5**  
**Matter and Its Changes**  
Lab. # 6  
Using the ph scale

**Objective**

To learn to use the ph scale correctly.

**Procedure**

Equipment

- 10 elements
- One beaker filled with water
- One eye dropper
- Container of ph paper



Directions:

Take each of the following elements one at a time and test each to see if it is acidic, alkaline or neutral. Wash the eye dropper after each element is tested to make sure that the tests are true.

**Observation:**

Fill in the following table indicating what each element is on the ph scale and whether it is an acid or a base or neutral.

<b>Element</b>	<b>ph reading</b>	<b>Acid or Base or Neutral</b>
vinegar		
lemon juice		
baking soda in water		
tomato juice		
salt water		
sodium bicarbonate in water		
sodium biphosphate in water		
boron in water		
sugar in water		
ammonia		

## **Conclusion**

1. Draw a diagram and label the colors for the ph scale.

2. What problem are Saskatchewan farmers having that may be solved if we can understand the ph process better?

**Core Unit**  
**Grade 5**  
**Matter and Its Changes**  
**Lab. # 6**  
**Using the ph test kit and scale**

**Objectives**

L.O. 2.5 (page 509, 6.6)  
To learn how to use the “ph” test kit and scale correctly.

**Equipment**

- a.) ph test kit
- b.) scale
- c.) ten elements

**Procedure**

Take each of the ten elements one at a time and use the “ph” test paper kit to see if the element being tested is A.) Acidic B.) Neutral C.) Alkaline  
Diagram: Draw and label the colors for the “ph” scale

**Observation**

Make sure that you record your findings right after testing.

**Conclusion**

.....  
.....  
.....  
.....

Record what type of “ph” the ten elements were after testing them.

<b>“PH” test</b>		
<b>Acidic</b>	<b>Neutral</b>	<b>Alkaline</b>

What problem do Saskatchewan farmers sometimes have that might be solved if we can understand the “ph” process better?

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**Core Unit**  
**Grade 5**  
**Matter and Its Changes**  
**Lab. # 6**  
**Using the ph test kit and scale**

**Objectives**

To learn how to use the “ph” test kit and scale correctly.

**Equipment**

- a.) ph test kit
- b.) scale
- c.) ten elements

**Procedure**

Take each of the ten elements one at a time and use the “ph” test paper kit to see if the element being tested is A.) Acidic B.) Neutral C.) Alkaline  
Diagram: Draw and label the colors for the “ph” scale

**Observation**

Make sure that you record your findings right after testing.

**Conclusion** .....  
.....  
.....  
.....

Record what type of “ph” the ten elements were after testing them.

<b>“PH” test</b>		
<b>Acidic</b>	<b>Neutral</b>	<b>Alkaline</b>

What problem do Saskatchewan farmers sometimes have that might be solved if we can understand the “ph” process better?

Core Unit  
Grade 5  
Matter and Its Changes  
Lab. # 7

**Objective: 1.4**

To split a chemical bond and create different molecules, this is known as a chemical change.

**Equipment:**

A tin can with a tight-fitting lid and a hole in the lid  
Wood chips  
A bunsen burner  
A stand, ring holder and asbestos pad  
Matches

**Procedure:**

Weigh the wood.  
Fill the can 1/2 full of wood chips. Heat the can over medium heat. Observe what comes out of the hole in the top of the can. Light a match and place it beside the hole. Observe the underside of the tin lid. Draw a diagram of the setup. Cellulose ( $C_{12}H_{20}O_{10}$ ) is the chief compound in wood. Burn some of the element that you find in the tin can. Weigh the product left in the can.

**Observation**

Give a written description of the process.

**Conclusion**

- A. What molecules are coming out of the hole in the tin lid?
- B. What is left in the tin can?
- C. What happens when you burn what is left in the tin can?
- D. How is it different from when you burn pure wood chips?
- E. How do you know a chemical reaction has taken place inside the tin can?
- F. What energy was used to create the chemical change?
- G. Where has the missing mass gone between the start and the end of the burning?

.....  
.....

*Student Activity Sheet*

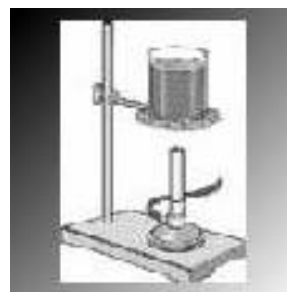
**Core Unit**  
**Grade 5**  
**Matter and Its Changes**  
**Chemical Changes**  
**Lab. # 7**

**Objective**

To split a chemical bond and create different molecules, this is known as a chemical change.

**Equipment:**

A tin can with a tight-fitting lid and a hole in the lid  
Wood chips  
A bunsen burner  
A stand, ring holder and asbestos pad  
Matches



**Procedure:**

Weigh the wood.  
Fill the can 1/2 full of wood chips. Heat the can over a bunsen burner's flame.  
OBSERVE what comes out of the hole in the top of the can's lid.  
Light a match and place it beside the hole, several times. OBSERVE the underside of the tin lid.  
Cellulose (C<sub>12</sub> H<sub>20</sub> O<sub>10</sub>) is the chief compound in wood. Burn some of the element that you find in the tin can. Weigh the product left in the can.  
Draw a diagram of the setup

**Observation:**

Write down observations on the lab set for the beginning and the end.

**Beginning:**

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End:

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Diagram: Draw a diagram and label the different parts showing how the above equipment was set up.

**Conclusion**

What atoms are coming out of the hole in the can's lid?

What element is left in the tin can?

What happens when you light a match to the element that is left in the tin can?

How is it different from when you burn pure wood chips?

How do you know a chemical reaction has taken place inside the tin can? ( 3 reasons )

a.)

b.)

c.)

What energy was used to create the chemical change?