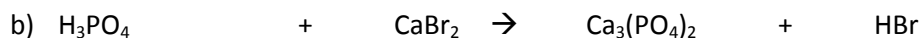
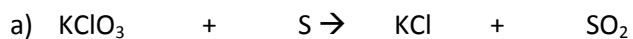


ST January 2013 Review

1. Classify as a chemical or physical change:

- Two powders are crushed and an enormous amount of heat and sound are released _____
- A compound of CH_3OH boils until it all evaporates _____
- A nail is hammered into a wall _____
- Skin forming a scab after it has been slightly cut. _____
- Five precious Belgian chocolates melt in your mouth _____
- Paint dries. Its mass *increases* as it forms a compound with oxygen. _____
- Zinc and oxygen combine to form ZnO _____
- Radio waves pass through your body _____

2. Balance the following equations:

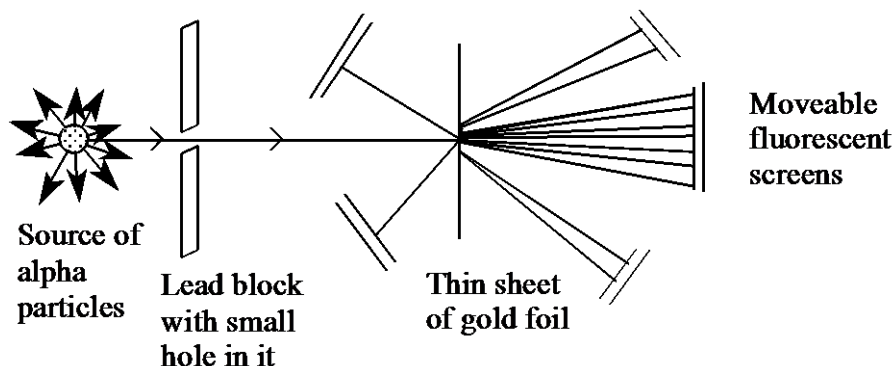


3. You observe the reaction between CaS and 2HCl which produces CaCl_2 and the poisonous H_2S .

The mass before the reaction was 143 g. The products only weighed 111 grams. What happened? Was mass conserved? If so why aren't the masses equal?

- A student dissociated water using acid and electricity. If he measured approximately 27ml of hydrogen, how many ml of oxygen was probably obtained?
- As a result of his famous experiment in which a thin sheet of gold foil was bombarded with alpha (α) particles, **Rutherford** significantly changed the atomic model proposed by Thomson.

The diagram below shows the trajectory of alpha particles passing through a thin sheet of gold foil or, in rare instances, being deflected on its surface.



Explain the results of this experiment.

6. Use your knowledge of the periodic table families to fill in the blanks
- The smallest alkaline earth metal is _____
 - The family that reacts with most metals is the _____
 - The least reactive family is the _____
 - _____ + Br₂ → 2 LiBr

- How many electrons does a neutral atom of boron have?
- How many protons are in a neutral atom of Ar?
- Which, if any, of the following has more electrons? P⁻³ or S⁻²
Show work

10. Your school's lab technicians have designed an interesting lab that uses calcium (Ca) but the school's shipment of calcium has not yet arrived. Rather than disappointing their students, the lab technicians decide not to cancel the lab and try to find a replacement for calcium.

a) Which element could replace calcium in the experiment? Explain your answer.

b) Draw a Rutherford- Bohr, a Thomson model and a Lewis diagram of calcium and the replacement element.

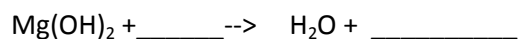
11. While building a machine for the science fair, you test a number of substances to determine how well they can conduct an electrical current.

Substance A	A sugar cube
Substance B	An iron nail
Substance C	Sea water (NaCl)
Substance D	Table salt (NaCl)
Substance E	HCl Solution
Substance F	NaOH solution

There is a chemical spill that releases magnesium hydroxide ($\text{Mg}(\text{OH})_2$) into the soil. Originally the pH of the soil is 7, after the spill the pH is 9. Two products: aqueous hydrogen iodide (HI) and potassium hydroxide (KOH) are available to neutralize the chemical spill.

a) Choose the product that will neutralize the spill. Justify your answer.

b) Complete and balance the chemical equation for this reaction.



12. Which of the following is the **most concentrated** solution? (2 marks)

- a) 30 g of solute / 5L of solution
- b) 5 g of solute / L of solution
- c) 0.1 g of solute /10L
- d) 3500 ppm solution

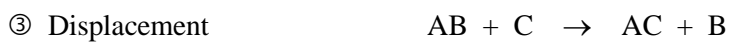
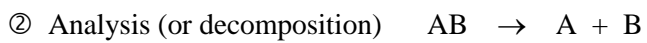
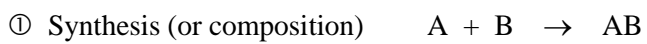
13. What type of energy(chemical, electrical, etc) is exemplified by each of the following:

- a) The energy stored in unburned oil
- b) The energy flowing through the copper wire leading to a lamp
- c) The energy released by a radioactive nucleus
- d) The energy of visible light

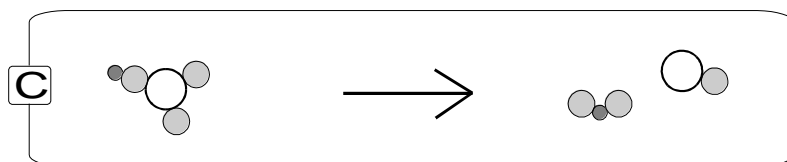
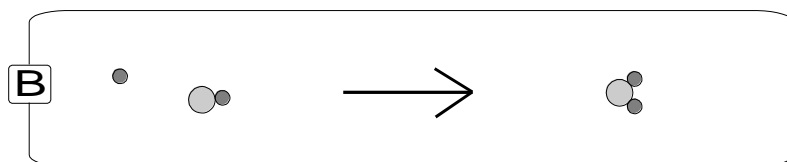
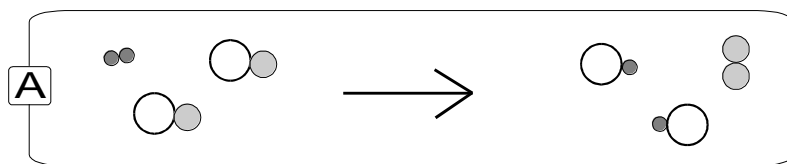
14. If an engine is 15 % efficient, how much energy does it waste if is supplied with 2000 kJ worth of gasoline? Show work.

PART 2

1. Three simple classifications of chemical reactions are:



The following illustrations represent the three reactions listed above; classify them:

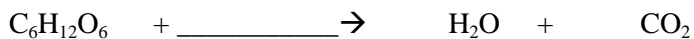


2. The following table lists the characteristics of a certain liquid.

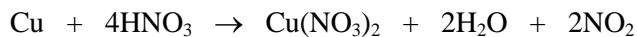
CHARACTERISTICS
Produces a gas when in contact with a piece of metal.
Conducts electricity.
Turns litmus paper red.

How would you describe this liquid?

- A) The liquid is a neutral solution.
- B) The liquid is an acidic solution.
- C) The liquid is a basic solution.
- D) The liquid is a neutral salt solution.
3. a) Write the balanced equation for cellular respiration.



- b) What is the ratio of products produced?
4. When 191 g of copper, Cu, is combined with 756 g of nitric acid, HNO₃, the chemical reaction produces 563 g of copper nitrate, Cu(NO₃)₂, 108 g of water, H₂O, and a certain amount of nitrogen dioxide, NO₂. This reaction is represented by the following balanced chemical equation:



What mass of nitrogen dioxide does this reaction produce?

5. Anna Banana needs to neutralize a window-cleaner that contains ammonia. When she tests it with red litmus paper, the paper turns blue.

a) What type of substance must she use to neutralize the cleaner? _____

b) What will 2 compounds will be produced after she neutralizes it? _____

6. In the laboratory, you are to neutralize an acid solution before disposing of it. Explain in detail how you would neutralize this solution. In your explanation, indicate the **material used and the steps involved**.

7. What are electrolytes?

8. What are ions?

9. How many electrons do the following ions have: Ca^{2+} , O^{2-} , K^{+1}

10. Are the following acids, bases, salts or neither? If they are electrolytes, what is their ionic dissociation?

Ionic Dissociation

a) HBr _____ _____

b) H_2O _____ _____

c) CH_4O _____ _____

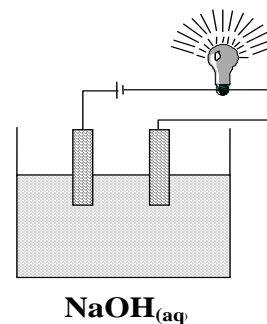
d) CaCl_2 _____ _____

e) NaOH _____ _____

11. The following diagram shows a solution being tested for electric conductivity with a conductivity meter.

Explain **why** and **how** the light bulb lights up for each sample being tested. You must refer to

- The nature of the solution.
- Ionic dissociation.
- The nature of the materials used in the conductivity meter.
- The components or construction of the conductivity meter.

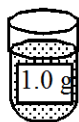


12. Convert the following concentration into ppm.

- a) $\frac{4 \text{ g}}{\text{L}}$
- b) $\frac{5 \text{ g}}{\text{kg}}$
- c) $\frac{0.06 \text{ g}}{100 \text{ mL}}$
- d) $\frac{0.7 \text{ g}}{100 \text{ g}}$

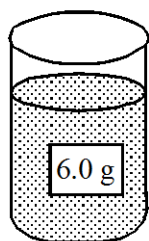
13. Consider the 4 solutions below :

Solution



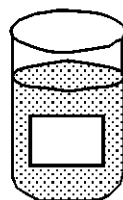
100 mL

Solution



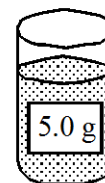
3 L

Solution



4000 ppm

Solution



200 mL

List the solutions from least to most concentrated.

14. What type of energy are the following objects associated with? (2 marks)

- a. Silicon wafer panel _____
- b. Eating food _____
- c. Hydro dam _____
- d. Batteries _____

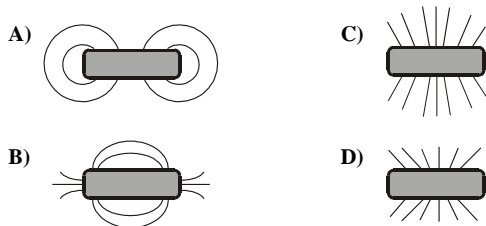
15. A toy car consumed 4000 kJ of energy.

- a) If its efficiency is only 15%, how much energy is actually used to move the car? Show all your work. (3 marks)
- b) If the car consumes triples the amount of energy, how much energy is wasted? Show all your work. (2 marks)

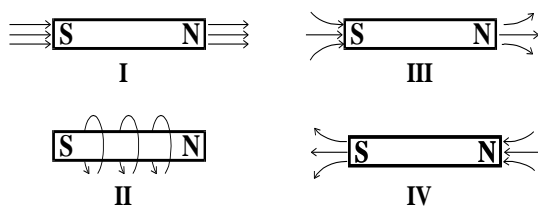
16. What type of energy are the following objects associated with?

- A power plant using uranium
- Candle
- Food

17. Marc wants to draw a sketch representing the magnetic field he observed around a current-carrying solenoid he used in the laboratory. Which sketch is *correct*?



18. Which of the following diagrams represents the magnetic lines produced by a bar magnet?



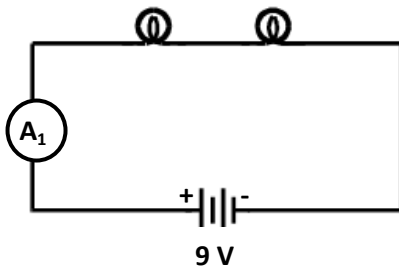
A) I

C) III

B) II

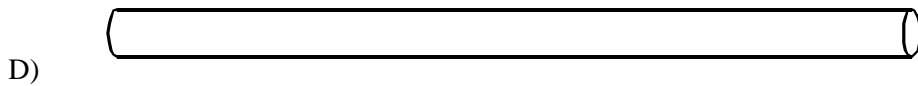
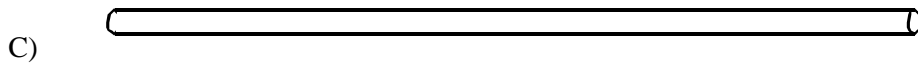
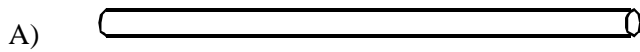
D) IV

19. Draw the direction of an electron current.



20. What are the 4 factors that influences the conductivity of a material?

21. The four conductors shown below are made out of copper. Which one has the greatest conductance



22. Which pair of substances can be used as conductors in an electric circuit?

- A) Aluminum and copper C) Copper and glass
B) Aluminum and porcelain D) Porcelain and glass

23. A manufacturer wants to insulate an electric wire with a non-conducting material. Which one of the following materials *cannot* be used for this purpose?

- A) Ceramic C) Plastic
B) Graphite D) Glass

24. In every neutral atom, the number of electrons is:

- A) less than the number of neutrons
B) equal to the number of neutrons
C) greater than the number of protons
D) equal to the number of protons

25. Which of the following substances are conductors?

- 1-Rubber 2-Plastic 3-Aluminum 4-Copper 5-Steel
- A) 1 and 2 C) 2, 4 and 5
B) 1 and 3 D) 3, 4 and 5

26. Which of the following properties of stainless steel explain why stainless steel pots may be used to cook food?

- 1- Not easily distorted
2- Average conductor of electricity
3- Good conductor of heat
4- Does not corrode
5- High density
6- High melting point
- A) 1, 2 and 3 C) 2, 4 and 5
B) 5 and 6 D) 3, 4 and 6

27. When we rub a glass rod with silk, the rod becomes electrically charged. What happens during the rubbing process?

The one that is higher on the list becomes negatively charged.

- Rubber
- Silk
- Wool
- Glass

28. A student conducted an experiment involving three electrically charged spheres A, B and C. The steps in the experiment and some of the results are given below.

STEP	RESULT
1. Bring sphere A close to sphere B.	1. They attracted each other.
2. Bring sphere A close to sphere C.	2. They repelled each other.
3. Bring sphere B close to sphere C.	3. ?

Given the above information, what was the result of Step 3?

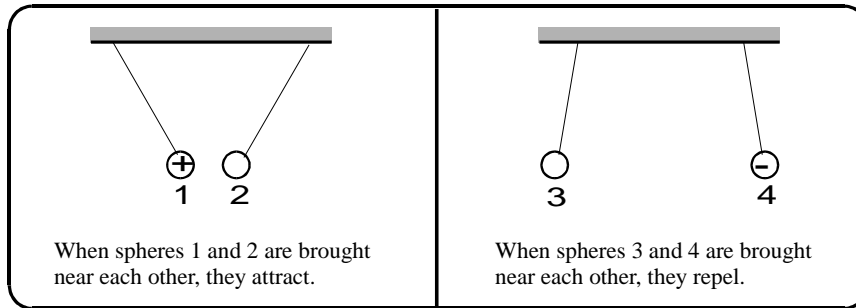
29. A balloon rubbed against human hair becomes negatively charged with static electricity.

Draw 3 diagrams and use (+) and (–) signs to show the electric charges and arrows to show any transfer of charges. **Explain each of the three steps.**

30. There are three simple ways to charge an object electrically: by rubbing, by direct contact and by induction. Which of the following statements are true?

1. It is very easy to charge a conductor by contact.
2. By rubbing, glass picks up electrons from silk and becomes positively charged.
3. An object charged by induction remains electrically neutral overall.
4. In a clothes drier, the clothes can become charged by contact.

31. Spheres 1, 2, 3 and 4 are electrically charged. The charge on sphere 1 is positive and the charge on sphere 4 is negative. We do not know the type of charge on spheres 2 and 3.



What type of charge is on sphere 2 and on sphere 3?

32. Which of the following is **TRUE** concerning a *series* circuit?

- I- The current through each element (resistor) is the same.
- II- The voltage drop across each element (resistor) is the same
- III- The sum of the voltage drops equals the power source voltage.

- a) I b) II c) III d) I and II e) I and III

33. Which of the following is **TRUE** concerning a *parallel* circuit?

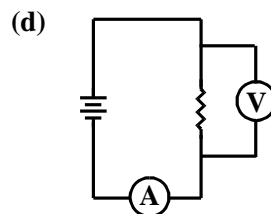
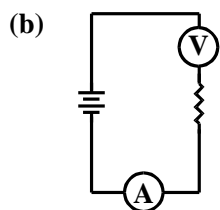
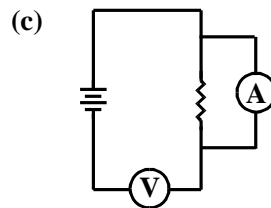
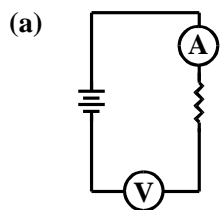
- I- The total resistance is less than the resistance of the lowest value resistor.
- II- Adding a resistor in parallel decreases the total resistance.
- III- Adding a resistor in parallel increases the total resistance.
- IV- The feed line current increases as more resistors are added in parallel.

- a) I and II b) I and IV c) II and IV d) I, II and IV e) I, III and IV

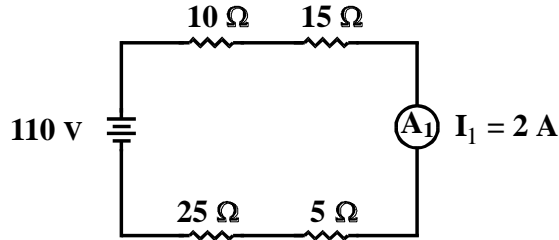
34. What must be the value of a resistor so that when connected in *parallel* with a $12\ \Omega$ resistor it produces a total resistance of $3\ \Omega$?

- a) $1\ \Omega$ b) $2\ \Omega$ c) $3\ \Omega$ d) $4\ \Omega$ e) $6\ \Omega$

35. Which of the following diagrams is *correct*?

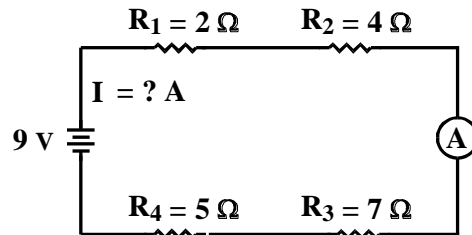


36. For the circuit below, what are the *voltage drops* across the $15\ \Omega$ and $25\ \Omega$ resistors respectively?



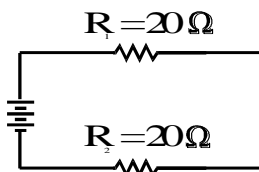
- a) 20 v and 30 v
 b) 10 v and 50 v
 c) 30 v and 50 v
 d) 20 v and 50 v
 e) 30 v and 10 v

37. The circuit on the right consists of 4 resistors whose values are $2\ \Omega$, $4\ \Omega$, $7\ \Omega$ and $5\ \Omega$ respectively.



Calculate the reading of the ammeter.

38. The following electric circuit consists of two resistors (R_1 and R_2) and a power source. What is the equivalent (or total) resistance of the circuit?



- (B) 2
- (C) 3
- (D) 4

45. Why does it take more than 4 hours to get from one tide to the next? That's because while the earth spins on its axis.....

- (A) The moon also rotates on its axis
- (B) The moon rotates around the earth
- (C) The sun rotates on its axis
- (D) The earth slows down due to the moon's gravitational tug