

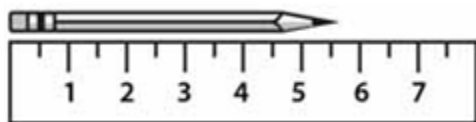


Chemistry Part 1 Midterm Exam

Name:

Date:

1. Infer a **quantitative** measurement that can be made from the scene shown below. Please use at least ONE complete content related sentence. (ref: p.13)



2. Explain the difference between mass and weight. Please use at least TWO complete content related sentences. (ref: p.9).

3. Scientific methods may include three steps of study as listed below. Explain each step **in detail** with a complete content related sentence. (ref: p.12-16)

a. Hypothesis

b. Theory

c. Scientific law

4. The figure shows a student mixing two chemicals. Is she following safe laboratory practices? Support your answer with details and discuss **at least 4 rules** that are not being followed. (ref: p.19 – Table 2)

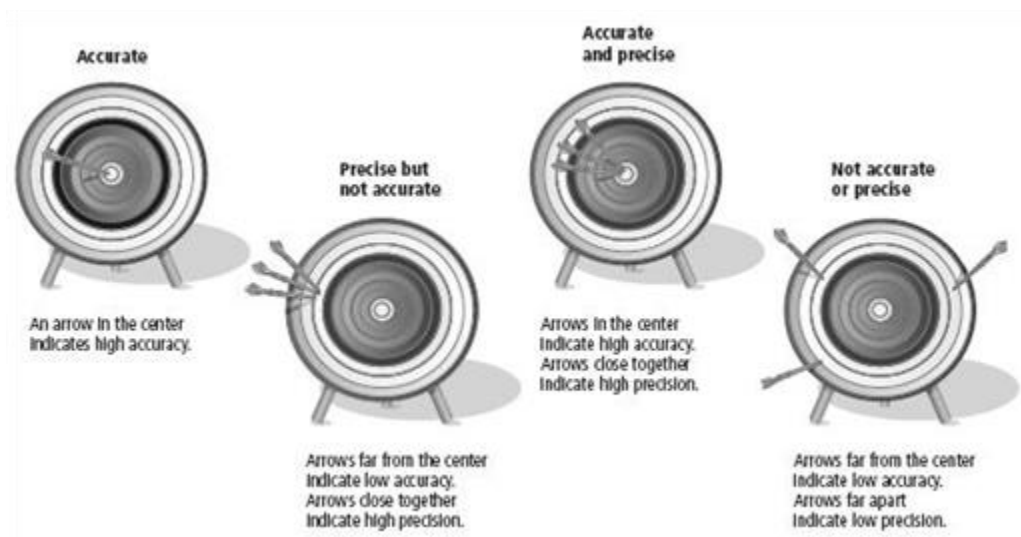


5. Show how to convert the temperature 84.7°C to Kelvin. Please include all steps and label the final answer. (ref: p.34-35)

6. Evaluate this dimensional analysis setup. A paperclip is 3.2 cm long. How many paperclips would fit in the length of a football field (100 yards) if $1\text{ inch} = 2.54\text{ cm}$? Be sure to show ALL steps in the conversion. (ref: p.40-46)



7. What is the relationship between accuracy and precision? Please use at least TWO complete content related sentences. (ref: p.47-48).



8. A vessel contains 30 mL of water. A sample of 5.0 g of copper metal is dropped into this vessel, raising the level of water in it to 40 mL. What is the density of the copper sample? Please show all steps leading to the final answer. (ref: p.36-38)

9. Distinguish between homogeneous and heterogeneous mixtures. Give an example of each one. Please include at least FOUR complete content related sentences. (ref p.80-82)

10. Two different compounds are formed by the elements nitrogen and oxygen. The first compound, compound P1, contains 64.17% by mass nitrogen and 35.73% by mass oxygen. The second compound, compound P2, contains 47.23% by mass nitrogen and 52.79% by mass oxygen. What is the ratio of nitrogen to a fixed mass of oxygen for the two compounds? Please show all steps and work leading to your final answer. (ref: p.87-89)



11. Distinguish among solids, liquids, and gases on the basis of their shape, their volume, and how their particles are packed together. Please use a minimum of THREE complete content related sentences. (ref: p.70-73)

12. You are provided a 20-mL solution of methanol and water. Be sure to respond to each part in complete content related sentences. (ref: p.82-83)

- Name the technique that you would use to separate and identify the components of the solution.
- Provide specific details of the method used.
- State the advantage of the method you choose.

13. Write the nuclear equation to describe the alpha decay of $^{243}_{95}\text{Am}$. (ref: p.122-124)

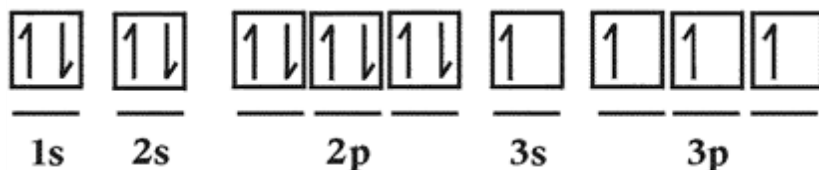
14. Write the chemical symbol for the isotope of cobalt with 37 neutrons. (ref: p.115-121)

15. List and define the characteristics of a wave. You should have 4 complete content related sentences (one for each part of the wave). (ref: p.136-137).

16. Predict how the wavelength and frequency of a wave would change if the amount of energy it carried was increased. Please use at least THREE content related sentences. (ref: p.138).



17. Which rule for filling of orbitals by electrons in the element Silicon is being violated in the orbital diagram shown below? Justify your answer with TWO complete content related sentences. (ref: p.156-160)



18. Explain the TWO major problems with this electron dot diagram for the element Nitrogen (N). Please use at least TWO complete content related sentences. (ref: p.161-162)



19. Calculate the wavelength of a body of mass 96.0 mg and moving with a velocity of 30.0 m/s. The value of Planck's constant is 6.626×10^{-34} J·s. Please show all steps and work leading to your final answer. (ref: p.150)

20. Arrange the elements given below in the increasing order of their atomic size. (ref: p.187-189)

Element A $1s^2 2s^2 2p^6$

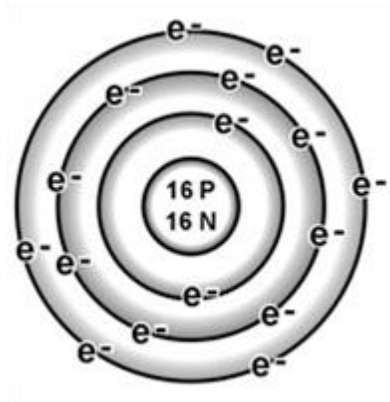
Element B $1s^2 2s^2$

Element C $1s^2 2s^2 2p^6 3s^1$

Element D $1s^2 2s^2 2p^3$

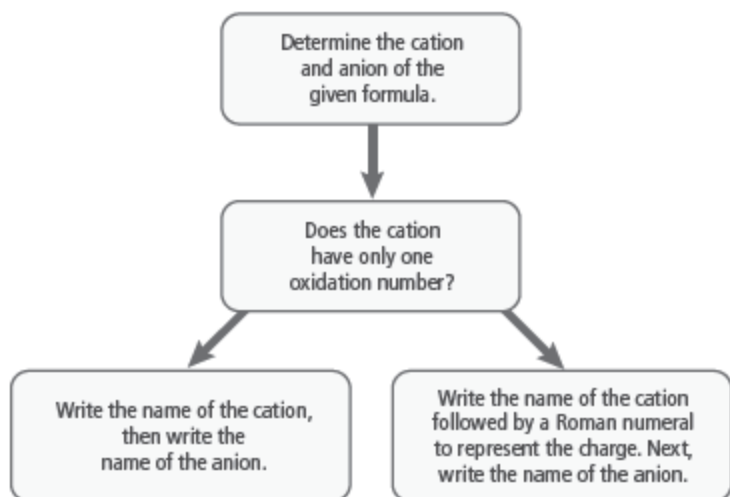


21. Is the atom below more likely to gain electrons or to lose electrons? Explain how you can tell. Please use at least TWO complete content related sentences. (ref: p.206-209)



22. A metal, magnesium, forms an ion by losing two electrons. What will be the formula of one formula unit of the ionic compound between magnesium and oxygen? (ref: p.218-224)

23. Use the Problem-Solving Strategy below to help you determine the name for Fe_2O_3 . You may write your response as a series of steps. (ref: p.218-224)





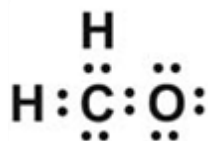
24. Explain why *sulfur aluminide* is not a correct name for the ionic compound formed between sulfur and aluminum. Please use at least TWO complete content related sentences. (Ref: p.206-209)

25. Look at the electron-dot diagram for neon in the table:

Electron-Dot Structures								
Group	1	2	13	14	15	16	17	18
Diagram	Li·	·Be·	·B·	·C·	·N·	·O·	·F·	·Ne·

Based on the table, explain why does neon have a very high ionization energy? Please use at least ONE complete content related sentence. (ref: p.206-209)

26. Examine the Lewis structure below. If it is a correct structure for formaldehyde, CH_2O , explain how it obeys the rules of drawing Lewis structures. If not, explain which rule(s) it does not follow and draw the correct structure. Please include at least 3 complete content related sentences. (ref: p.253-260)



27. Why is PCl_5 an exception to the octet rule, while PCl_3 is not? Please use at least ONE complete content related sentence. (ref: p.265-270)



28. Give the formula for each compound below. (ref: p.248-252)

Name of Compound	Formula of Compound
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dihydrogen oxide	
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silver chloride	
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chlorine trifluoride	
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29. Ammonia is formed with one nitrogen and three hydrogen atoms. What is the electron configuration of nitrogen? How many lone pairs of electrons are present in nitrogen in an ammonia molecule? (ref: p.240-247)

30. Why is it necessary to use prefixes in naming covalent compounds? Please use at least THREE complete content related sentences. (Ref: p.248-252)

31. Write an example of each type of chemical reaction with its symbolic equation. You can use generic or actual equations. (Ref: p.289-298)

a. single-replacement

b. decomposition

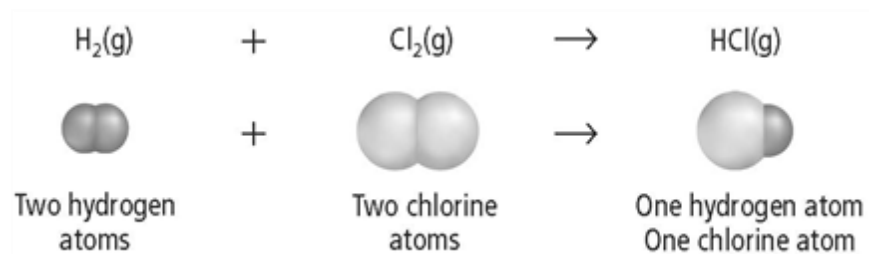
c. synthesis

d. double-replacement

e. combustion

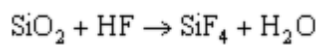


32. Balance the following skeleton equation as illustrated below. (Ref: p.282-288)



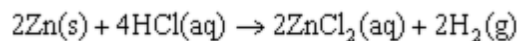
33. Define a decomposition reaction. Please use at least ONE complete content related sentence. (ref: p.292)

34. Add the correct coefficients to properly balance the following equation. (ref: p.282-288)





35. Explain what is wrong with this balanced chemical equation and write the correct equation. (ref: p.299-308)



36. A sample of aluminum chloride (AlCl_3) has a mass of 37.2 g. Please show all steps and work leading to your final answer. (ref: p.333-340)

a. How many aluminum ions are present?

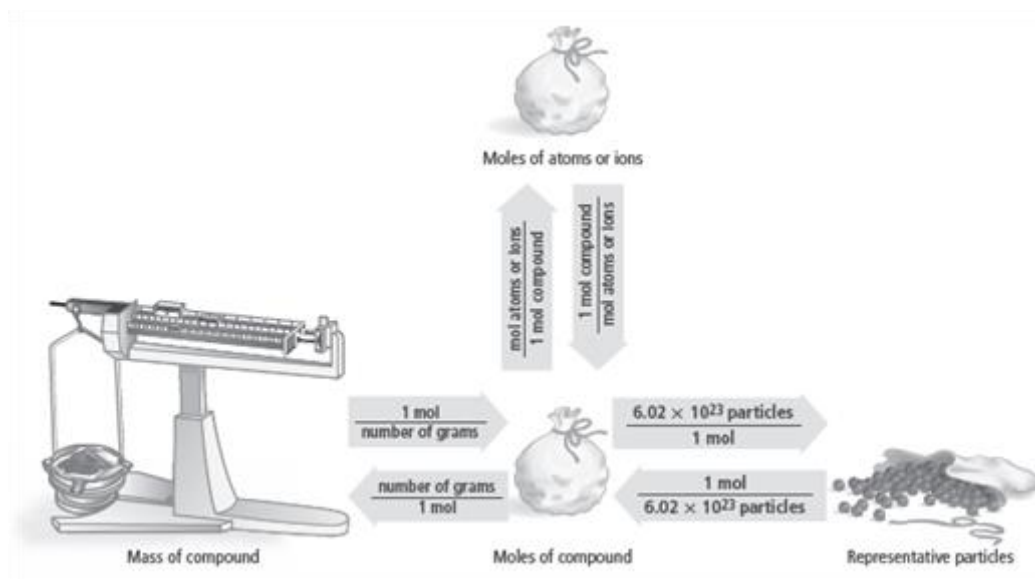
b. How many chloride ions are present?

c. What is the mass in grams of one formula unit of aluminum chloride? Please show all steps and working leading to your final answer.

37. Determine the empirical formula for succinic acid that is composed of 40.60% carbon, 5.18% hydrogen, and 54.22% oxygen. Please show all steps and work leading to your final answer. (ref: p.341-350)



38. A sample of calcium chloride, CaCl_2 , has a mass of 27.8 g. (ref: p.330-340)



a) How many moles of calcium chloride are in this mass? Please show all steps and work leading to your final answer.

b) How many chloride ions are present? Please show all steps and work leading to your final answer.

39. List the steps needed to convert the number of atoms to the mass of an element. (Hint: there are 2). (ref: p.325-330)

40. Explain the steps for naming an oxy-acid. (ref: p.252 fig 12)