

CHEM-118 Final Exam (54 Points)

Fall 2024

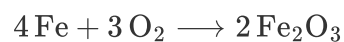
1. Which scientific approach or skill is most crucial in researching novel chemical reactions? (2 points)
 - A) Attention to safety protocols
 - B) Use of scientific literature
 - C) Experimental design
 - D) Ability to work independently
 - E) All of the above
2. Calculate the density of methanol if 145.0 grams occupies a volume of 184 mL. (2 points)
 - A) 0.688 g/mL
 - B) 0.788 g/mL
 - C) 0.837 g/mL
 - D) 1.12 g/mL
 - E) 1.27 g/mL
3. Convert 550 centimeters into yards. (1 yard = 3 feet, 1 foot = 12 inches, 1 inch = 2.54 cm) (2 points)
 - A) 6.01 yards
 - B) 5.45 yards
 - C) 5.96 yards
 - D) 6.15 yards
4. Convert 98.0 °F to Kelvin. (2 points)
 - A) 310 K
 - B) 30.3 K
 - C) 36.7 K
 - D) 298 K
5. If a substance has a mass of 750 milligrams, how many kilograms is this mass equivalent to? (2 points)
 - A) 0.0075 kg
 - B) 0.00075 kg
 - C) 0.075 kg
 - D) 7.5 kg

6. Determine the number of significant figures in the measurement 0.0067000. (2 points)
- A) 2
 - B) 3
 - C) 5
 - D) 6
7. How many significant figures are in the measurement of 0.01230? (2 points)
- A) 3
 - B) 4
 - C) 5
 - D) 6
8. Calculate $(7.00 \times 10^4) \div (3.50 \times 10^2)$ and express the result with the correct number of significant figures. (2 points)
- A) 200
 - B) 2.0×10^2
 - C) 2.00×10^2
 - D) 200.0
9. Calculate the sum $3.451 + 0.0532 + 56.8$ with the correct number of significant figures. (2 points)
- A) 60.30
 - B) 60.304
 - C) 60.3
 - D) 60.3042
10. If 750.0 J of heat is supplied to a 50.0 g sample of ethanol (specific heat capacity $c = 2.44 \text{ J/g}^\circ\text{C}$), by how many degrees Celsius will the temperature increase? (2 points)
- A) 6.15°C
 - B) 6.55°C
 - C) 6.87°C
 - D) 7.09°C
11. What type of change occurs when a rust forms on iron? (2 points)
- A) Physical change
 - B) Chemical change
 - C) Both physical and chemical changes
 - D) Neither

12. The process of a living organism's metabolism converting sugar to fat is an example of: (2 points)

- A) Physical change
- B) Chemical change
- C) Physical weathering
- D) None of the above

13. Given the reaction: (2 points)



If 112.0 grams of Fe reacts completely with 48.0 grams of O_2 , what is the mass of iron(III) oxide produced?

- A) 64.0 g
- B) 80.0 g
- C) 160.0 g
- D) 44.0 g

14. An element with an atomic number 30, mass number 65, and 28 electrons forms which ion? (2 points)

- A) Zn^{2+}
- B) Zn^{3+}
- C) Ni^{2+}
- D) Ni^{+}

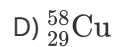
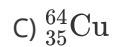
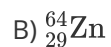
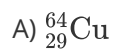
15. An element has an atomic number of 16, mass number of 32, and 18 electrons. What is the ion's symbol? (2 points)

- A) S^{2+}
- B) S^{2-}
- C) Ge^{2-}
- D) F^{2-}

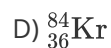
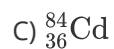
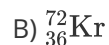
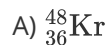
16. Which atomic symbol represents an element with 24 protons and 28 neutrons? (2 points)

- A) Co
- B) Mn
- C) Fe
- D) Cr

17. An element has 29 protons, 35 neutrons, and 29 electrons. What is the correct isotopic symbol for this element? (2 points)



18. An element has 36 protons, 48 neutrons, and 36 electrons. What is the isotopic symbol? (2 points)



19. How many atoms of each element are present in $\text{Al}_2(\text{SO}_4)_3$? (2 points)

A) Al: 2, S: 3, O: 8

B) Al: 2, S: 1, O: 12

C) Al: 1, S: 3, O: 12

D) Al: 2, S: 3, O: 12

20. What is the correct name for P_4O_5 ? (2 points)

A) Phosphorus pentoxide

B) Tetraphosphorus oxide

C) Tetraphosphorus pentoxide

D) Phosphorus(III) oxide

21. What is the correct name for $\text{Ca}(\text{NO}_2)_2$? (2 points)

A) Calcium nitrite

B) Calcium nitrate

C) Calcium nitride

D) Calcium nitrogen oxide

22. What is the mass of 2.50 moles of Na_2CO_3 ? (2 points)

- A) 106.0 grams
- B) 265.0 grams
- C) 42.4 grams
- D) 127.5 grams

23. Find the number of moles in 352.8 g of SO_2 ? (2 points)

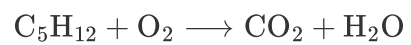
- A) 4.510 mol
- B) 7.341 mol
- C) 6.406 mol
- D) 5.507 mol

24. How many moles are in 1.50×10^{24} molecules of oxygen gas, O_2 ? (2 points)

- A) 2.49 moles
- B) 0.401 moles
- C) 3.51 moles
- D) 0.529 moles

25. Calculate the mass percent composition of carbon in $\text{C}_6\text{H}_{12}\text{O}_6$. Use units and proper mathematical notation throughout your calculations. (3 Points)

26. Balance the following chemical equation: (3 Points)



27. Reflect on a particularly challenging concept you encountered this semester. Describe one strategy you used to overcome the difficulty. (3 points Extra Credit)