



Polytechnic Tutoring Center

Midterm I REVIEW Answer Key – CM 1004, Fall 2020

Disclaimer: This mock exam is only for practice. It was made by tutors in the Polytechnic Tutoring Center and is not representative of the actual exam given by the Academic Department.

The Exam is designed to test concepts, not exact knowledge so please do not worry if some questions seem outside of what you have learned. Watch the solution video when uploaded to see the method of solving each of these problems. The main focus is to understand the approach to problem solving.

Use this key to resolve problems you missed

1. A, sigfig use least amount of numbers after decimal in +/- and least amount of numbers in total in multiplication Units divide into g/L
2. D, definition of ionic bond is two molecules of opposite charges. Mind the difference between covalent bond and ionic bond.
3. 45.58%, using Fe as 56, C as 12 N as 14 divide mass of iron over total molecular mass (392g/860g)
4. B, assume 100g, multiply each percent by atomic mass and take the sum
5. E, chemical property involve a change in matter, physical don't
6. D. $\text{Zn(s)} + \text{HCl(aq)} \rightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$
moles = molarity*volume. find moles of hydrogen produced. convert from grams to volume using the ideal gas law
7. D, use density and volume to find mass, divide by number of molecules and multiply avogadro's number
8. B, balance carbon, then hydrogen, then oxygen
9. A, alkali group 1, halogen group 7, transition in the F block, please pay attention to all other groups.
10. C, cobalt III bonds with 3 chlorines. There may be some confusion about this problem. For the nonmetal part, without prefix usual implies 1, however, there are three Cl here. The reason why it is still chloride alone is because the

charge of cobalt is marked and we know the charge of Cl is -1 So it's unnecessary to say trichloride

11. A, atomic number = 20, 2+ removes 2e-
12. D, opposite charges switch subscripts
13. B, find change in volume, divide grams by volume
14. $\text{Pb}^{2+}\text{(aq)} + \text{SO}_4^{2-}\text{(aq)} \rightarrow \text{PbSO}_4\text{ (s)}$
Break apart soluble compounds, switch ions, check for solubility of new molecules. You should be able to write of both ionic and net ionic equations.
15. D, solubility rules chart
16. C, definition of reaction types
17. D 4 moles of aluminium/ 3 moles of oxygen multiplied by moles of Al
18. 134.6 g, convert grams of copper to moles of copper, to moles of copper II nitrate, to mass of copper II nitrate. Using Cu as 63.5 N as 14 O as 16
19. B, SO₄ is -2 charge
20. B, definition of allotropes
21. Balance reaction: $\text{S}_8\text{ (s)} + 12 \text{O}_2\text{ (g)} \rightarrow 8 \text{SO}_3\text{(g)}$
 - a) O₂ is the limiting reagent and 8.3g of SO₃
 - b) 95% yield
22. E, definition of metal displacement, the more reactive Na kicks out H



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b) $\text{Ba}(\text{OH})_2$, compare number of moles of product formed by fully reacted $\text{Ba}(\text{OH})_2$ vs HClO_3

c) 7.21g, using limiting reagent

d) HClO_3 8.45g. Non limiting reagent is in excess. Calculate number of moles of HClO_3 uses and subtract from initial