

17 OLD Multiple Choice problems through stoichiometry from the Regents Exam

- Compared to the charge of a proton, the charge of an electron has
 - a greater magnitude and the same sign
 - a greater magnitude and the opposite sign
 - the same magnitude and the same sign
 - the same magnitude and the opposite sign
- In the wave-mechanical model of the atom, an orbital is defined as
 - a region of the most probable proton location
 - a region of the most probable electron location
 - a circular path traveled by a proton around the nucleus
 - a circular path traveled by an electron around the nucleus
- When an excited electron in an atom moves to the ground state, the electron
 - absorbs energy as it moves to a higher energy state
 - absorbs energy as it moves to a lower energy state
 - emits energy as it moves to a higher energy state
 - emits energy as it moves to a lower energy state
- Which polyatomic ion is found in the compound represented by the formula NaHCO_3 ?
 - acetate
 - hydrogen carbonate
 - hydrogen sulfate
 - oxalate
- The atomic mass of magnesium is the weighted average of the atomic masses of
 - all of the artificially produced isotopes of Mg
 - all of the naturally occurring isotopes of Mg
 - the two most abundant artificially produced isotopes of Mg
 - the two most abundant naturally occurring isotopes of Mg
- Which element has atoms that can form halide ions?
 - iodine
 - silver
 - strontium
 - xenon
- Which terms identify types of chemical reactions?
 - decomposition and sublimation
 - decomposition and synthesis
 - deposition and sublimation
 - deposition and synthesis
- Compared to the physical + chemical properties of the compound NO_2 , the compound N_2O has
 - different physical properties and different chemical properties
 - different physical properties and the same chemical properties
 - the same physical properties and different chemical properties
 - the same physical properties and the same chemical properties

9. Which change results in the formation of different substances?
(1) burning of propane (2) melting of $\text{NaCl}_{(s)}$
(3) deposition of $\text{CO}_{2(g)}$ (4) solidification of water
10. Which element is a liquid at STP? (1) bromine (2) cesium (3) francium (4) iodine
11. Which notations represent different isotopes of the element sodium?
(1) ^{32}S and ^{34}S (2) S^{2-} and S^{6+} (3) Na^+ and Na^0 (4) ^{22}Na and ^{23}Na
12. Which electron configuration represents the electrons in an atom of Ga in an excited state?
(1) 2-8-17-3 (2) 2-8-17-4 (3) 2-8-18-3 (4) 2-8-18-4
14. What is the gram-formula mass of $\text{Fe}(\text{NO}_3)_3$?
(1) 146 g/mol (2) 194 g/mol (3) 214 g/mol (4) 242 g/mol
15. Given the balanced equation representing a reaction: $\text{Al}_2(\text{SO}_4)_3 + 6\text{NaOH} \rightarrow 2\text{Al}(\text{OH})_3 + 3\text{Na}_2\text{SO}_4$
The mole ratio of NaOH to $\text{Al}(\text{OH})_3$ is (1) 1:1 (2) 1:3 (3) 3:1 (4) 3:7
16. Which equation represents a single replacement reaction?
(1) $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ (2) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
(3) $\text{H}_2\text{SO}_4 + \text{Mg} \rightarrow \text{H}_2 + \text{MgSO}_4$ (4) $\text{HCl} + \text{KOH} \rightarrow \text{KCl} + \text{H}_2\text{O}$
17. The accepted value for the percent by mass of water in a hydrate is 36.0%. In a laboratory activity, a student determined the percent by mass of water in the hydrate to be 37.8%.
What is the percent error for the student's measured value?
(1) 5.0% (2) 4.8% (3) 1.8% (4) 0.05%
18. What is the oxidation number of manganese in KMnO_4 ? (1) 7 (2) 2 (3) 3 (4) 4

Answers follow on the next page...

| | | |
|---|----|---|
| 1. Protons have equal + opposite charge to electrons. Proton mass AND neutron mass = 1 AMU. Electrons have no mass (in high school). | 1 | 4 |
| 2. (sub)orbitals (shells) are zones, or regions where electrons exist in an atom.. | 2 | 2 |
| 3. Electrons in the excited state have already gained energy. When they return to the ground state, they emit that gained energy as spectra that we can see. | 3 | 4 |
| 4. HCO_3^{-1} is on Table E, it's called hydrogen carbonate (look at table E now) | 4 | 2 |
| 5. ALL the naturally occurring isotopes are measured by proportion to calculate the average weighted atomic mass that is put into the periodic table. | 5 | 2 |
| 6. Halides are the halogens of group 17, which are fluorine, chlorine, bromine and iodine. | | |
| 7. Decomposition + synthesis are chemical reactions. Sublimation and deposition are phase changes (physical changes) from solid to gas, or gas to solid. | | |
| 8. The 2 compounds, NO_2 and N_2O , by definition, have different chemical properties and will have different physical properties too (like density, boiling point, melting point, etc.) | 6 | 1 |
| 9. Burning propane is combustion (products = $\text{CO}_2 + \text{H}_2\text{O}$). The others are phase changes: rearranged particles but no new substances form and you get no new properties. | 7 | 2 |
| 10. Check table S. STP is standard pressure and 273 Kelvin. You would have to compare the melting and boiling points to find out that 273 K is in between the MP and BP for bromine. | 8 | 1 |
| 11. Isotopes are chemically identical atoms but have different masses because they have different numbers of neutrons. Choice 1 looks sorta good, but S is sulfur NOT SODIUM! | 9 | 1 |
| 12. Ground state gallium has this electron configuration: 2-8-18-3. It is atom number 31 and has 31 electrons. Only choice 2 could be correct here. | 10 | 1 |
| 14. Gram formula mass is the tricky way to say molar mass. Here it's 242 g/mole. The regents will abbreviate grams per mole as g/mol because they want to trick you. | | |
| 15. It's 6:2 and you should never change it, but this is a tricky question, 3:1 is equivalent (but dumb) | 11 | 4 |
| 16. Magnesium replaces hydrogen, you did this in lab, Mg is higher (more reactive) than H on table J | 12 | 2 |
| 17. The CORRECT answer is +5.00%, with the + sign + 3 SF. The "best" choice would be 5.0%. | | |
| 18. The ionic compound KMnO_4 has a "net charge" of 0. Inside the compound are cations + anions that sum to ZERO. The K is +1, four oxygen ions are -2 each, the Mn charge is the unknown. Do the math: $(+1) + (X) + (4 \times -2) = 0 \rightarrow (+1) + (X) + (-8) = 0$ X MUST BE +7 choice 1 They omit the sign here to torment you, but that's the best choice. | 14 | 4 |
| | 15 | 3 |
| | 16 | 3 |
| | 17 | 1 |
| | 18 | 1 |