

## Regents 27-51 Answers

- 27 Which quantities must be conserved in all chemical reactions? (2) mass, charge, energy  
The Law of Conservation of Mass (matter), Conservation of Charge, and Conservation of Energy
- 28 Which phrase describes the distribution of charge and the polarity of a  $\text{CH}_4$  molecule?  
(2) symmetrical and nonpolar  
The molecule is nonpolar because it has radial symmetry. The polar bonds are “in balance” with each other.
- 29 What is the charge of the nucleus of an oxygen atom? (2) 8  
A terrible question from NYS. The real answer MUST BE +8! Choose the BEST answer always.
- 30 Which ion has no electrons? (1) H Another “name” for the  $\text{H}^{+1}$  cation (in acid/base chem) is a proton.
- 31 To break a chemical bond, energy must be (1) absorbed  
When bonds BREAK, it takes energy to do this. When bonds form, energy is released.
- 32 Every chlorine atom has (4) an atomic number of 17  
The only tricky answer was mass of 35; remember this: there are ISOTOPES of chlorine with different numbers of neutrons (mass)
- 33 Which substance can not be broken down by a chemical change? (4) phosphorus  
This is the only element, all the others are compounds.
- 34 At standard pressure, which substance becomes less soluble in water as temperature increases from 10. to 80.°C?  
(1) HCl Look at table G, it's the only molecular compound in this short list.
- 35 Which type of concentration is calculated when the grams of solute is divided by the grams of the solution, and the result is multiplied by 1 000 000? (3) parts per million Multiplied by ONE MILLION (duh!)
- 36 Which type of energy is associated with the random motion of atoms and molecules in a sample of air?  
(4) thermal energy More motion = higher KE = higher temperature (thermal energy)
- 37 In which type of chemical reaction does one reactant change into two or more products? (1) decomposition  
One reactant means the only thing that it can do is break down, gotta be decomp.
- 38 Which statement explains why argon is a Group 18 element?  
(2) Argon atoms have a stable valence electron configuration.  
Noble gases don't react by definition, because they have full orbitals ONLY. So stable they don't even bond.
- 39 Which element has chemical properties that are most similar to the chemical properties of chlorine?  
(3) bromine Same group = similar.
- 40 What occurs as two atoms of oxygen combine to become a molecule of oxygen?  
(2) A bond is formed as energy is released.  
If you don't remember that forever then I have failed you as a teacher.

- 41 What is the number of pairs of electrons that are shared between the nitrogen atoms in a molecule of  $O_2$ ?  
(3) 2      Two pairs, or 4 electrons, either way, but this answer is 2 pairs.
- 42 Which phrase describes an atom?    (4) a positively charged nucleus surrounded by negatively charged electrons  
Ernest Rutherford showed this, with his GOLD FOIL experiment. Plus you KNOW this.
- 43 An orbital is defined as a region of the most probable location of    (1) an electron      You can't not know this one!
- 44 The bright-line spectrum of an element in the gaseous phase is produced as  
(4) electrons move from higher energy states to lower energy states  
Niels Bohr wins the Nobel Prize for explaining electrons in orbits (orbitals now) and spectra.
- 45 An atom of lithium-7 has an equal number of (2) electrons + protons  
ALL atoms and all isotopes of all atoms have equal numbers of positive protons = negative electrons
- 46 Which set of values represents standard pressure and standard temperature?    (3) 101.3 kPa and  $0^\circ\text{C}$   
Look at Table A, go slowly.  $273\text{ Kelvin} = 0^\circ\text{C}$
- 47 Which statement about one atom of an element identifies the element?    (1) The atom has 1 proton.  
The atomic number is the number of PROTONS. This atom must be hydrogen. It also has that number of electrons (see #45)
- 48 A substance is classified as either an element or a (1) compound  
Pure stuff make up substances. They are elements and compounds only. Vocab.
- 49 A solid element that is malleable, a good conductor of electricity, and reacts with oxygen is classified as a  
(1) metal      Malleable means bendable when smashed with a hammer. Clearly this is a metal.
- 50 Three forms of energy are (2) chemical, thermal, and electromagnetic      Vocab
- 51 What is the total amount of heat required to vaporize 1.00 gram of  $\text{H}_2\text{O}_{(l)}$  at  $100.^\circ\text{C}$  and 1 atmosphere?  
(4) 2260 J    This is the heat of vaporization ( $H_v$ ) for water, table B