**Science Bowl Questions**

**Round 1**

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* What is the systematic name for baking soda?

W) Sodium Biphosphate

X) Calcium Carbonate

Y) Sodium Hydrogen Carbonate

Z) Disodium Phosphate

ANSWER: Y) SODIUM HYDROGEN CARBONATE

**BONUS**

1. CHEMISTRY *Short Answer* If Raul has a block of solid carbon dioxide, what is the common name of the substance he has?

ANSWER: DRY ICE

**TOSS-UP**

1. CHEMISTRY *Short Answer* What is the name of the bond that gives water its high specific heat?

ANSWER: HYDROGEN BOND (S)

**BONUS**

1. CHEMISTRY *Short Answer* How many hydrogen bonds can the oxygen atom of one molecule of water form?

ANSWER: 2

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* Which of the following will NOT replace Hydrogen in a Single Displacement Reaction?

W) Magnesium

X) Sodium

Y) Potassium

Z) Copper

ANSWER: Z) COPPER

**BONUS**

1. CHEMISTRY *Short Answer* Elements from which group on the Periodic Table can replace any ion below it in a Single Replacement Reaction?

ANSWER: HALOGENS (ACCEPT 7A)

**TOSS-UP**

1. CHEMISTRY *Short Answer* If Julio has one molecule of hexane, how many more Hydrogen atoms does he have than Carbon atoms?

ANSWER: 8

**BONUS**

1. CHEMISTRY *Short Answer* Is C2H4 an alkane, alkene or alkyne?

ANSWER: ALKENE

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* What was the name of the scientist who developed the infamous oil drop experiment?

W) John Dalton

X) Robert Millikan

Y) Niels Bohr

Z) Max Planck

ANSWER: X) ROBERT MILLIKAN

**BONUS**

1. CHEMISTRY *Short Answer* In Rutherford’s Gold Foil Experiment, what was the name of the particle that bounced back after being fired at the gold foil?

ANSWER: ALPHA PARTICLE

**TOSS-UP**

1. CHEMISTRY *Short Answer* What is the common name for C2H6O2?

ANSWER: ETHYLENE GLYCOL

**BONUS**

1. CHEMISTRY *Short Answer* What is the name of a reaction that will occur at any given time without the input of energy?

ANSWER: SPONTANEOUS REACTION

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* When there are too few neutrons and too many protons, what type of radioactive decay ensues?

W) Alpha Decay

X) Beta Decay

Y) Positron Emission

Z) Gamma Decay

ANSWER: Y) POSITRON EMISSION

**BONUS**

1. CHEMISTRY *Short Answer* If a radioactive substance with a half-life of 40 years decays for 80 years what percentage of the original sample will remain?

ANSWER: 25%

**TOSS-UP**

1. CHEMISTRY *Short Answer* What is the name of the measure of energy required to completely separate a mole of solid ionic compound into its separate ions?

ANSWER: LATTICE ENERGY

**BONUS**

1. CHEMISTRY *Short Answer* As lattice energy increases, what happens to the ionic bond?

ANSWER: IT STRENGTHENS/BECOMES STRONGER

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* Nonmetals tend to do what with electrons when they form bonds?

W) Give Them Up

X) Gain Them

Y) Turn Them Into Positrons

Z) Do Nothing With Them

ANSWER: X) GAIN THEM

**BONUS**

1. CHEMISTRY *Multiple Choice* What happens to ionization energy as you go towards the top right of the periodic table?

W) Increases

X) Decreases

Y) Stays the Same

Z) Is Variable

ANSWER: W) INCREASES

**TOSS-UP**

1. CHEMISTRY *Short Answer* What is the name of the conjugate pair of HCl?

ANSWER: CHLORINE (ACCEPT “CL”)

**BONUS**

1. CHEMISTRY *Short Answer* What is the name given to the strong acid or base of known identity and concentration which is added to an unknown acid or base solution in an acid-base titration?

ANSWER: TITRANT

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* Which of the following affect both the frequency of collision, as well as the energy of collisions?

W) Concentration of Reactants

X) Nature of Reactants

Y) Catalysts

Z) Temperature

ANSWER: Z) TEMPERATURE

**BONUS**

1. CHEMISTRY *Short Answer* Catalysts increase the rate of reaction by lowering which energy?

ANSWER: ACTIVATION ENERGY

**TOSS-UP**

1. CHEMISTRY *Short Answer* What is the oxidation state for any Alkali Metal involved in a compound?

ANSWER: +1

**BONUS**

1. CHEMISTRY *Short Answer* At what electrode does Oxidation occur in an electrochemical cell?

ANSWER: ANODE

**TOSS-UP**

1. CHEMISTRY *Short Answer* What is the name of the part of the vessel that neutralizes excess charge buildup in a redox reaction?

ANSWER: SALT BRIDGE

**BONUS**

1. CHEMISTRY *Short Answer* In which type of electrochemical cell must energy be supplied for a reaction to occur?

ANSWER: ELECTROLYTIC CELL

**TOSS-UP**

1. CHEMISTRY *Short Answer* An ester is essentially which 2 other functional groups put together?

ANSWER: (IN ANY ORDER) KETONE AND ETHER

**BONUS**

1. CHEMISTRY *Short Answer* In an esterification reaction, an organic acid reacts with what generic organic compound to produce an ester and water?

ANSWER: ALCOHOL

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* What section of the electromagnetic spectrum is situated in the 100- 400 nanometer wavelength range?

W) Near Infrared

X) Far Infrared

Y) Visible Light

Z) Ultraviolet

ANSWER: Z) ULTRAVIOLET

**BONUS**

1. CHEMISTRY *Short Answer* In which type of reaction is a bond broken as a molecule absorbs a photon of light energy?

ANSWER: PHOTODISSOCIATION (ACCEPT PHOTO-LYSIS/-DECOMPOSITION)

**TOSS-UP**

1. CHEMISTRY *Short Answer* In an acidic solution, what color will a litmus test show?

ANSWER: RED (ACCEPT PINK/MAGENTA)

**BONUS**

1. CHEMISTRY *Multiple Choice* In a flame test, a violet flame would mean which of the following gases was being tested?

W) Potassium

X) Barium

Y) Sodium

Z) Calcium

ANSWER: W) POTASSIUM

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* What is the formula for Sodium Azide?

ANSWER: NaN3

**BONUS**

1. CHEMISTRY *Short Answer* Balance the following Chemical Equation: Fe + Cl2 = FeCl3

ANSWER: 2, 3, 2

**TOSS-UP**

1. CHEMISTRY *Short Answer* When a liquids viscosity reaches zero, then it transforms into what separate phase of matter?

ANSWER: SUPERFLUID

**BONUS**

1. CHEMISTRY *Multiple Choice* A substance is considered superconductive when it has no inner magnetic field and also when what value is at exactly zero?

W) Temperature

X) Pressure

Y) Electrical Potential

Z) Electric Resistance

ANSWER: Z) ELECTRIC RESISTANCE

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* For a molecule to be considered aromatic, it *must* obey which of the following rules?

W) Hess’s Law

X) Hückel’s Rule

Y) Hammond-Leffler Postulate

Z) Henry’s Law

ANSWER: X) HÜCKEL’S LAW

**BONUS**

1. CHEMISTRY *Short Answer* Hückel’s Rule states that a molecule is aromatic only when it follows what expression, which *must* equal the number of π electrons?

ANSWER: 4*n*+2

**TOSS-UP**

1. CHEMISTRY *Short Answer* The Wave Model describes electrons in what singular body, moving in orbitals?

ANSWER: CLOUDS

**BONUS**

1. CHEMISTRY *Short Answer* Which principle states that no two electrons can occupy the same quantum state simultaneously?

ANSWER: PAULI EXCLUSION PRINCIPLE

**TOSS-UP**

1. CHEMISTRY *Short Answer* Who discovered the electron?

ANSWER: J.J. THOMPSON

**BONUS**

1. CHEMISTRY *Short Answer* What is the electron configuration for Carbon?

ANSWER: 1s2 2s2 2p2  (ACCEPT [He] 2s2 2p2)

**TOSS-UP**

1. CHEMISTRY *Short Answer* A molecule of Carbon in the form of a tube, hollow sphere, or ellipsoid is classified under what general allotropic term?

ANSWER: FULLERENE

**BONUS**

1. CHEMISTRY *Short Answer* A fullerene that is spherical is classified under what specific class of fullerene?

ANSWER: BUCKYBALL(S)

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* What part of a solution is usually present in greater amounts?

W) Liquid

X) Gas

Y) Solute

Z) Solvent

ANSWER: Z) SOLVENT

**BONUS**

1. CHEMISTRY *Short Answer* Milk is an example of what type of liquid solution?

ANSWER: COLLOID

**TOSS-UP**

1. CHEMISTRY *Short Answer* Any substance that contains free ions that causes the substance to become electrically conductive is known as what?

ANSWER: ELECTROLYTE

**BONUS**

1. CHEMISTRY *Short Answer* Which type of electrolyte is specifically a gel in a lattice framework?

ANSWER: DRY ELECTROLYTES

**TOSS-UP**

1. CHEMISTRY *Multiple Choice* If an ion contains unpaired electrons, what type of ion is it?

W) Radical

X) Charged

Y) Neutral

Z) Cation

ANSWER: W) RADICAL

**BONUS**

1. CHEMISTRY *Short Answer* When metal cations and nonmetal anions are attracted to each other, they form what type of chemical substance?

ANSWER: SALT