CHEMISTRY *Short Answer* Barium titanate exhibits this quality, as it can become electrically polarized when it is mechanically distorted.

ANSWER: Piezoelectric

CHEMISTRY *Short Answer* This polymer class is particularly of use in soft contact lenses, which requires both hydrophobic and hydrophilic substituents. Name this type of polymer, in which short chains of a certain polymer are attached to a long chain of another type of monomer.

ANSWER: Graft Polymer

CHEMISTRY *Short Answer* Give the overall order of a reaction, given that its rate equation is given by Rate=k[A]1[B]2

ANSWER: 3

CHEMISTRY *Multiple Choice* Which of the following properties would increase as a result of the addition of a solute?

W) Vapor Point

X) Boiling Point

Y) Freezing Point

Z) Ideality of Solution

ANSWER: Boiling Point

CHEMSITRY *Short Answer* In a powder diffraction experiment, constructive interference was observed at angle of 30 degrees, with the use of radiation of wavelength 154 picometers. What is the spacing of the layers in the sample responsible for this diffraction?

ANSWER: 154 pm

CHEMSITRY *Short Answer* Examples of elements that have lattice structures with this kind of packing are manganese and zinc. This has packing layers of ABABAB…, and has a coordination number of 12.

ANSWER: Hexagonal close-packed structure

CHEMISTRY *Short Answer* This is the change in energy in a molecule resulting from bond rotation. When the value of this increases, the structure rotates from a staggered conformation to an eclipsed conformation. During this process the central C-C bond weakens, and the potential energy rises.

ANSWER: Rotational energy OR Torsional Energy OR Torsional Strain

CHEMISTRY *Short Answer* In the graph of a weak acid-strong base titration curve, which of the following four statements would you expect to observe?

1. A gradually rising section of the curve will appear before the sharp rise to the equivalence point.
2. The initial pH of the curve will be higher than that of a strong acid-strong base titration curve.
3. To determine when the equivalence point has been reached, phenolphthalein would be a logical choice for a buffer.
4. Beyond the equivalence point, the graph have symmetry to the portion of the graph before the equivalence point.

ANSWER: 1,2,3

CHEMISTRY *Multiple Choice* Which of the following ratios for the number of neutrons to the number of protons is the most stable for heavier nuclides?

W) 1

X) 1.5

Y) 2

Z) 2.5

ANSWER: X) 1.5

CHEMESTRY *Short Answer* Given the general equation A(s)+ 3B(aq) -> C(s)+ 4 D(aq), give the reaction quotient.

ANSWER: [(D)4]/ [(B)3]

CHEMISTRY *Short Answer* Given the reaction 2NO(g)+O2(g)-> 2NO2(g) with a rate of k[NO]2[O2], give the order with respect to O2 and overall.

ANSWER: First order to O2 and 3rd overall

CHEMISTRY *Multiple Choice* Which of the following is an example of a buffer system:

W) H2CO3 and water

X) H2CO3 and NaHCO3

Y) NH3 and N2

Z) NaCl and KCl

ANSWER: X) H2CO3 and NaHCO3

CHEMISTRY *Short Answer* Calculate the molar mass of a polymer chain, if you are given that the chain has a degree of polymerization of 7000, and its repeating unit has a molar mass of 30g.

ANSWER: 2.1\*105g/mol

CHEMISTRY *Short Answer* Name which of the following three statements is or are true about catalysts.

1. Catalysts only speed up the forward reaction, hence, producing the reactants quicker
2. Catalysts lower the activation energy by providing an alternate energy pathway
3. In general, all catalysts make the rate constant larger.

ANSWER: 2,3

CHEMISTRY *Short Answer* Give the name for substances that by the Bronsted Definition of acids and bases are able to function as both acids and bases by acting as a proton donor and acceptor.

Answer: Amphiprotic

CHEMISTRY *Multiple Choice* The hydrolysis of a fat using a solution of a strong hydroxide is called

W) neutralization

X) esterification

Y) saponification

Z) condensation

ANSWER: Y) saponification

CHEMISTRY *Short Answer* Rank the following 3 compounds in terms of greatest to least viscosity.

1. Tetrachloromethane
2. Ethanol
3. Octane

ANSWER: Ethanol, Tetrachoromethane, Octane

CHEMISTRY *Short Answer* Rank the rates of effusion of the following four gases in order of greatest to least rate of effusion.

1. Neon
2. Fluorine
3. Oxygen
4. Helium

ANSWER: Helium, Neon, Oxygen, Fluorine

CHEMISTRY *Multiple Choice* Which of the following would best explain why trimethylamine melts at a lower temperature than dimethylamine?

W) London dispersion forces are significantly greater in trimethylamine.

X) Trimethylamine cannot form hydrogen bonds.

Y) The torsion energy of trimethylamine will cause it to be more stable as a liquid.

Z) There is a induced dipole force in trimethylamine that causes its molecules to aggregate.

ANSWER: X) Trimethylamine cannot form hydrogen bonds.

CHEMISTRY *Short Answer* The two discovers of this class of catalyst shared the Nobel prize in 1963. Traditionally, they are used in the synthesis of polymers of alpha-olefins, and are made up in large proportion by organoaluminum compounds. One example, is the molecule triethylaluminim.

ANSWER: Zeiger-Natta Catalyst.

CHEMISTRY *Short Answer* Name all of the following three statements that are true regarding rate laws.

1. The integrated rate law of a first order reaction is directly proportional to the concentration.
2. The Zero order rate has a slope of –k, when concentration is graphed against time.
3. As molecules get bigger in size, they tend to react more frequently at the same temperature as smaller molecules.

ANSWER: 1, 2