

King Saud University
College of Engineering
Civil Engineering Department

CE 442 Water & Wastewater Treatment

1st Semester 1428-1429H / 2007-2008G

Section: Dr. W. Zahid

Mid-term Exam

Student Name:

Student Number:

Question One (20%)

For each statement, circle the letter of the most appropriate answer:

- (1) The atomic weight of an atom is the number of:
a. protons. b. protons and neutrons. c. electrons and neutrons.
- (2) A molar solution is a solution that contain one:
a. Molecular weight of a substance per liter of water.
b. Equivalent weight of a substance per liter of water.
c. mg of a substance per liter of water.
- (3) Volatile solids of a water sample is the:
a. residual solids remaining after igniting the sample at 500 °C.
b. difference between the dry solids remaining after sample evaporation and the residual solids remaining after ignition at 500 °C.
c. difference between the dry solids remaining after sample evaporation and the evaporated solids after ignition at 500 °C.
- (4) The Imhoff cone is used to measure:
a. suspended solids. b. settleable solids. c. both a and b.
- (5) The unit of measurement for water turbidity is:
a. NTU. b. mg/L. c. both a and b.
- (6) The unit of measurement for water color is:
a. meq/L. b. NTU. c. TCU.
- (7) Adding an acid to water will add:
a. OH⁻. b. H⁺. c. H⁺ and OH⁻.
- (8) Conductivity of water is used to as a measure of:
a. total solids. b. suspended solids. c. dissolved solids .
- (9) The alkalinity of a water sample with a pH of about 7 would be in the form of:
a. carbonate. b. bicarbonate. c. hydroxide.
- (10) The chemical oxidant used in the dichromate reflux method for COD measurement is:
a. calcium dichromate. b. sulfuric acid. c. potassium dichromate.
- (11) The pH of water is a measure of its:
a. hydrogen ion concentration. b. alkalinity. c. both a and b.
- (12) The biochemical oxygen demand is used to measure the concentration of:

- a. biodegradable organics.
 - b. non-biodegradable organics.
 - c. both a and b.
- (13) Selection of water treatment processes depends on:
- a. quality of raw water.
 - b. desired quality of product water.
 - c. both a and b.
- (14) Filtration media with smaller uniformity coefficients have:
- a. long filtration run. b. short filtration run. c. low filtration rate.
- (15) The performance of gravity sand filters is judged by:
- a. effluent quality. b. filter run. c. both a and b.
- (16) In the precipitation softening process of water, lime is added to remove:
- a. carbonate hardness. b. non-bicarbonate hardness. c. both a and b.
- (17) Addition of alum to water:
- a. increases the pH. b. reduce the alkalinity. c. both a and b.
- (18) In comparison with the ion-exchange softening, the lime-soda softening is :
- a. more economical. b. less economical. c. more efficient.
- (19) Eutrophication of water bodies is due to the presence of excessive concentrations of:
- a. nitrogen. b. phosphorus. c. both a and b.
- (20) Cholera is a:
- a. bacterial disease. b. viral disease. c. protozoan disease.
- (21) The membrane–filter technique for the enumeration of coliforms in water:
- a. gives a statistical estimate of coliforms.
 - b. gives a direct count of coliforms. c. both a and b.
- (22) Aeration of groundwater can remove:
- a. dissolved gases. b. soluble compounds. c. both a and b.
- (23) Highly alkaline water often has:
- a. a high level of dissolved solids.
 - b. a high level of suspended solids. c. both a and b.
- (24) Important design parameters that govern the efficiency of the coagulation/flocculation process are:
- a. chemical type and dosage.
 - b. mixing time and pH. c. both a and b.

- (25) Volatile solids of a water sample is a measure of the:
a. organic content. b. inorganic content. c. both a and b.

Question Two (20%)

Answer with true (T) or false (F):

- () (1) A mole of an element contains 6.02×10^{23} molecules.
- () (2) Isotopes are elements that have the same number of proton but different number of electrons.
- () (3) If electrons are lost from an atom, the atom is called cation.
- () (4) A standard solution is a solution whose strength or reacting value per unit volume is known.
- () (5) Highly alkaline waters have bitter taste.
- () (6) Non-carbonate hardness results from the presence of sulfates and bicarbonates of calcium and magnesium.
- () (7) Water softer than 30-50 mg/L as CaCO_3 tends to be corrosive .
- () (8) The presence of iron and manganese in water causes metallic taste.
- () (9) Trace metals are those metals that are harmful and toxic in large amounts.
- () (10) Ammonia is very toxic to aquatic life because it is highly soluble in water.
- () (11) Drinking of water with high nitrate content causes blue-baby disease in infants.
- () (12) Total Kjeldahl nitrogen includes both organic nitrogen and nitrate.
- () (13) Most of the organics in sanitary wastewater is non-biodegradable.
- () (14) Addition of sodium hydroxide to water will increase its pH.
- () (15) Most of the micro-organisms in domestic wastewater are pathogenic.
- () (16) Coliform bacteria inhabit the intestines of humans and animals in small numbers and always present in feces along with any pathogen.
- () (17) Reclaimed water is wastewater that has been treated for reuse.
- () (18) Drinking water standards specify the maximum and minimum levels of substances and contaminants in drinking water for the protection of human health.
- () (19) Water treatment plants are designed for the maximum hourly demand.
- () (20) Turbid water can be clarified by plain sedimentation.
- () (21) Particles of uniform size are difficult to coagulate than different-size particles.



