
Bishops College
Midterm Exam 2009
Science 1206

January 29, 2009

Name: _____

Part 1 - 50% - Multiple Choice

Choose the best answer and indicate your answer on the Scantron sheet

- Which term describes the variety of living organisms in an ecosystem?
 - Biology
 - Bioaccumulation
 - Biodiversity
 - Biosphere
- Which best defines an ecosystem?
 - The relationship between the biotic and abiotic factors in an area.
 - The relationship between different species in an area.
 - The relationship between levels of sunlight and heat capacity.
 - The total biomass of a community.
- Which term describes a bear which eats both plants and other animals?
 - autotroph
 - herbivore
 - carnivore
 - omnivore
- Which model expresses all the possible feeding relationships within an ecosystem ?
 - Food web
 - Food chain
 - Trophic diagram
 - Pyramid of energy
- During which process is oxygen used to release energy from glucose molecules?
 - Photosynthesis
 - Cellular respiration
 - Transpiration
 - Nitrogen fixation
- Which of the following would be considered part of the abiotic environment ?
 - dissolved oxygen
 - fish population
 - microscopic animal life
 - microscopic plant life
- Which process converts inorganic carbon in the atmosphere (CO_2) into organic carbon in living organisms?
 - Combustion
 - Photosynthesis
 - Respiration
 - Denitrification
- Two wolves are fighting over the same food. This an example of ...
 - intraspecific competition
 - interspecific competition
 - symbiosis
 - succession
- In most food webs, how are hawks best described?
 - scavengers.
 - predators.
 - primary consumers
 - producers.

10. A sustainable ecosystem is one that:
- always remains the same
 - changes to meet the changing needs of society
 - meets the needs of present generations without compromising the needs of future generations
 - allows for a continuously expanding economy for all countries
11. Rabbits feed upon herbs and the bark of young trees and shrubs. They are preyed upon by foxes, hawks, and other predators. What do these statements describe about the rabbit?
- ecosystem
 - community
 - habitat
 - niche

For items 12 to 15, select the biome of Canada that is described in each of the statements. Each choice may be used more than once.

- KEY: A. tundra
 B. boreal forest
 C. temperate deciduous forest
 D. grassland

12. This biome is known for its deep rich soil.
13. The dominant vegetation in this biome is conifers.
14. This biome is the main biome found in Newfoundland and Labrador.
15. This biome is the most fragile of the Canadian biomes.
16. Which of the following shows a correct example of the relationship indicated?

	Relationship	Example
A.	parasitism	bird eats insects
B.	commensalism	bird builds a nest in a tree
C.	mutualism	bird has lice
D.	predation	bird eats seeds

17. In the food web at the right, which organism is at the same trophic level as the rabbit?
- hawk
 - grasshopper
 - fox
 - vole
18. What is the source of energy for a food web such as the one above ?
- Heat
 - Sunlight
 - Fossil fuels
 - Oxygen
19. Which set of abiotic conditions describes the microclimate beneath a fallen log compared to the microclimate on top of a fallen log?
- Sunlight is more intense; less moisture; less wind exposure; warmer
 - Sunlight is more intense; more moisture; less wind exposure; warmer
 - Sunlight is less intense; more moisture; less wind exposure; cooler
 - Sunlight is less intense; less moisture; more wind exposure; cooler

20. Which plant organisms are the first to be able to grow in primitive soil formed in a bare-rock succession?
- A. Grasses
 - B. Ferns
 - C. Mosses
 - D. Algae
21. If 50 000 kJ of energy is available in the producers of a food chain, about how much energy is passed on to secondary consumers?
- A. 50 000 kJ
 - B. 5 000 kJ
 - C. 500 kJ
 - D. 10 kJ
22. DDT is a fat-soluble pesticide which may enter marine food chains . Which of the following organisms would you expect to have the highest concentration of DDT in its system? [plankton > capelin > codfish > seals]
- A. plankton
 - B. seals
 - C. capelin
 - D. codfish
23. Spring runoff of nitrogen in fertilizers:
- A. helps improve the quality of waterways
 - B. promotes the growth of excess amounts of algae
 - C. provides more oxygen for fish and other aquatic organisms
 - D. is generally beneficial to the environment
24. Which nutrient cycle involves plant and animal proteins ?
- A. Water cycle
 - B. Carbon cycle
 - C. Oxygen cycle
 - D. Nitrogen cycle
25. Which of the following is a primary succession?
- A. A forest gradually grows where there was once a school playground.
 - B. Plant and animal life gradually cover a newly-formed volcanic island.
 - C. A farmer plants a new crop of wheat in his field each year.
 - D. A new forest gradually grows back where people have cut trees for fuel.
26. Which is true concerning the flow of energy and matter in an ecosystem?
- A. both energy and matter are recycled
 - B. neither energy nor matter are recycled
 - C. only energy is recycled, matter is lost
 - D. only matter is recycled, energy is lost
27. Which of the following is considered to be a reservoir for organic carbon?
- A. Forests
 - B. Earth's crust
 - C. oceans
 - D. the atmosphere
28. Which of the following soil layers is composed of small rock particles and humus?
- A. topsoil
 - B. litter
 - C. subsoil
 - D. bedrock
29. What is the result of applying the same pesticide year after year?
- A. results in complete eradication of the pest;
 - B. kills more of the pests with each application;
 - C. kills fewer of the pests with each application;
 - D. costs too much money to be practical.

30. Which is a sustainable forestry practice?
- Clearing forested land for a housing development
 - Cutting the best trees from a forest and leaving the older diseased trees.
 - Damming a river and flooding a forested area
 - Replanting white spruce seedlings in a cutover.
31. What is a substance composed of two or more elements which are chemically combined?
- Solution
 - Compound
 - Homogeneous mixture
 - Heterogeneous mixture
32. Which of the following would be considered a chemical change?
- Peeling vegetables
 - Freezing water
 - Dew forming on a leaf
 - Food rotting
33. What are the positively charged particles in the nucleus of an atom called?
- Protons
 - Neutrons
 - Electrons
 - Ions
34. Which set of elements contains only nonmetals?
- C, Cl, Li
 - Cl, S, P
 - Al, Sr, K
 - I, H, Ag
35. To which chemical family does the element potassium belong?
- Alkali metals
 - Alkaline earths
 - Halogens
 - Noble gases
36. Which element is in group 2A and period 4 of the periodic table?
- Mg.
 - Ca
 - Br
 - K
37. Which element forms an ion with a 2+ charge and is in period 3?
- Aluminum
 - Magnesium
 - Phosphorus
 - Silicon
38. How many electrons are there in the outer energy level of a chlorine atom?
- 1
 - 7
 - 17
 - 36
39. Which of the following is a true statement concerning atoms?
- Electrons are found only in the nucleus
 - Only protons and electrons are charged particles.
 - The number of protons equals the number of neutrons
 - The number of neutrons equals the number of electrons

40. What is the charge on an ion with 12 protons, 10 neutrons, and 11 electrons?
- 1+
 - 2+
 - 1-
 - 2-
41. Which of the following is a correct description of molecular compounds?
- Are formed by the transfer of electrons
 - Are formed by covalent bonds
 - Involve bonding of metals and nonmetals
 - Involve attractions of oppositely charged ions
42. Which of the following is an ionic compound?
- Ammonia
 - Table salt
 - Table sugar
 - Vinegar
43. Which expression best describes a chemical reaction?
- Rearrangement of atoms
 - Speeding up of particles
 - New atoms created.
 - Physical properties of reactants are the same as those of the products.
44. Which term best describes an ion?
- atom which has lost or gained electrons
 - atom which has lost or gained protons
 - atom which has lost or gained neutrons
 - atom which shares electrons
45. Which best explains why noble gases are nonreactive?
- their first energy level has 2 electrons
 - their outermost energy level is filled
 - their second energy level has 8 electrons
 - their first energy level has 8 electrons
46. Which symbol would be found on most pesticides and other yard products?
- Poisonous
 - Corrosive
 - Flammable
 - Explosive
47. What does a balanced chemical equation tell about a chemical reaction?
- Compounds and elements remain unchanged in a chemical reaction.
 - Atoms are neither created nor destroyed in chemical reactions.
 - The total mass always increases during a chemical reaction.
 - The mass of any gases involved can be ignored.
48. An unknown gas is tested with a glowing splint. If the splint bursts into flame, what is the unknown gas?
- Oxygen
 - Hydrogen
 - Carbon dioxide
 - Nitrogen
49. The following reaction is an example of which reaction type?
- $$\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$$
- synthesis
 - combustion
 - decomposition
 - single displacement

50. Which of the following is an example of a synthesis (composition) reaction?
- heating calcium carbonate strongly;
 - putting sodium into water to produce hydrogen gas and sodium hydroxide;
 - The burning of a candle
 - putting copper into oxygen to produce copper (II) oxide.
51. Which is the best example of a molecular compound held together by a covalent bond?
- LiF
 - NaCl
 - Al₂S₃
 - CH₄
52. Which element is most similar to carbon?
- iodine
 - hydrogen
 - silicon
 - magnesium
53. Which is NOT an indicator of a chemical change?
- heat given off
 - colour change
 - formation of a gas
 - products are colourless
54. Which equation represents a decomposition reaction?
- $2 \text{Mg} + \text{O}_2 \rightarrow 2 \text{MgO}$
 - $\text{Zn} + 2 \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
 - $\text{Ag}_2\text{S} \rightarrow 2 \text{Ag} + \text{S}$
 - $\text{Pb}(\text{NO}_3)_2 + 2 \text{KI} \rightarrow \text{PbI}_2 + 2 \text{KNO}_3$
55. What is the chemical name of Sn₃(PO₄)₄?
- tin phosphate
 - tin(II) phosphate
 - tin (IV) phosphate
 - tin (III) phosphate
56. What is the correct formula and name of an ionic compound?
- Ca₂O - calcium oxide
 - Cs₂O - cesium oxide
 - K₂O - dipotassium oxide
 - OF₂ - oxygen difluoride
57. Which element can produce two different cations?
- Ag
 - Cu
 - Mg
 - Na
58. What is the formula for nitrous acid?
- H₃N(aq)
 - HNO₂(aq)
 - H₂NO₂(aq)
 - HNO₃(aq)
59. XF₂ is the formula of a metallic fluoride. What is the formula of the corresponding metallic oxide?
- XO
 - XO₂
 - XO₄
 - X₂O
60. What does this WHMIS symbol represent?
- biohazardous substance
 - compressed gas
 - highly reactive material
 - strong oxidizer

Part 2 - 40%

Complete each of the following as indicated in the space provided on this test paper.

- 1. A. Construct a food chain using the organisms below . Label each organism according to its trophic level. (3%)

Hawk, spruce budworm, shrew, Spruce trees

Food Chain: _____

Trophic Levels: _____

- B. Give 3 reasons why so much energy is lost from one trophic level to the next in an ecosystem. (3%)

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- C. Photosynthesis and respiration are complementary processes - one depends on the other in the natural environment. Explain why this is so with reference to raw materials, products, and energy in each process. (3%)

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- 2. A.. Discuss two impacts that deforestation has on the carbon cycle. (2%)

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- B. State two ways that bacteria are important in the nitrogen cycle. (2%)

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5. Draw the electron energy level diagram for each of the following. (2%)

A.) aluminum atom

B.) sulfide ion

6. White phosphorus P_4 ignites in air to produce heat, light and P_4O_{10} according to the reaction below.



- A. Provide the chemical name for the product in the above reaction. (1%)

- B. Is this reaction endothermic or exothermic? Why? (1%)

- C. What is the name of the missing reactant in the equation above? _____ (1%)
- D. How would the mass of P_4O_{10} compare to the mass of P_4 burned? Explain. (1%)

7. Complete the table below by providing the name or formula as indicated. (10%)

Name of Compound	Correct Formula
sodium carbonate	
dinitrogen tetraoxide	
calcium phosphate	
magnesium sulfate hexahydrate	
ammonia	
titanium (III) bromide	
	$Zn(OH)_2$
	CS_2
	H_2O_2
	NH_4NO_3
	$HF(aq)$
	$K_2Cr_2O_7$

8. Classify each reaction type and balance the equation. (4%)

(A) Reaction type : _____



(B) Reaction type : _____



(C) Reaction type : _____



(D) Reaction type : _____

