



2008 U. S. NATIONAL CHEMISTRY OLYMPIAD

LOCAL SECTION EXAM



Prepared by the American Chemical Society Olympiad Examinations Task Force

OLYMPIAD EXAMINATIONS TASK FORCE

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DIRECTIONS TO THE EXAMINER

This test is designed to be taken with an answer sheet on which the student records his or her responses. All answers are to be marked on that sheet, not written in the booklet. Each student should be provided with an answer sheet and scratch paper, both of which must be turned in with the test booklet at the end of the examination. Local Sections may use an answer sheet of their own choice.

The full examination consists of 60 multiple-choice questions representing a fairly wide range of difficulty. Students should be permitted to use non-programmable calculators. A periodic table and other useful information are provided on page two of this exam booklet for student reference.

Suggested Time: 60 questions—110 minutes

DIRECTIONS TO THE EXAMINEE

DO NOT TURN THE PAGE UNTIL DIRECTED TO DO SO.

This is a multiple-choice examination with four choices for each question. There is only *one* correct or best answer to each question. When you select your choice, blacken the corresponding space on the answer sheet with your pencil. Make a heavy full mark, but no stray marks. If you decide to change your answer, be certain to erase your original answer completely.

Not valid for use as an ACS Olympiad Local Section Exam after March 29, 2008. **STOCK CODE OL08**

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ABBREVIATIONS AND SYMBOLS					
ampere	A	Faraday constant	<i>F</i>	molal	<i>m</i>
atmosphere	atm	formula molar mass	<i>M</i>	molar	<i>M</i>
atomic mass unit	u	free energy	<i>G</i>	molar mass	<i>M</i>
atomic molar mass	<i>A</i>	frequency	ν	mole	mol
Avogadro constant	N_A	gas constant	<i>R</i>	Planck's constant	<i>h</i>
Celsius temperature	°C	gram	g	pressure	<i>P</i>
centi- prefix	c	heat capacity	C_p	rate constant	<i>k</i>
coulomb	C	hour	h	retention factor	R_f
electromotive force	<i>E</i>	joule	J	second	<i>s</i>
energy of activation	E_a	kelvin	K	temperature, K	<i>T</i>
enthalpy	<i>H</i>	kilo- prefix	k	time	<i>t</i>
entropy	<i>S</i>	liter	L	volt	V
equilibrium constant	<i>K</i>	milli- prefix	m		

CONSTANTS
$R = 8.314 \text{ J}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$
$R = 0.0821 \text{ L}\cdot\text{atm}\cdot\text{mol}^{-1}\cdot\text{K}^{-1}$
$1 F = 96,500 \text{ C}\cdot\text{mol}^{-1}$
$1 F = 96,500 \text{ J}\cdot\text{V}^{-1}\cdot\text{mol}^{-1}$
$N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$
$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$
$c = 2.998 \times 10^8 \text{ m}\cdot\text{s}^{-1}$
$0^\circ\text{C} = 273.15 \text{ K}$
$1 \text{ atm} = 760 \text{ mmHg}$

EQUATIONS		
$E = E^\circ - \frac{RT}{nF} \ln Q$	$\ln K = \left(\frac{-\Delta H}{R} \right) \left(\frac{1}{T} \right) + \text{constant}$	$\ln \left(\frac{k_2}{k_1} \right) = \frac{E_a}{R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$

PERIODIC TABLE OF THE ELEMENTS

1										18							
1A										8A							
1	2										13	14	15	16	17	2	
H	He										B	C	N	O	F	Ne	
1.008	4.003										10.81	12.01	14.01	16.00	19.00	20.18	
3	4									5	6	7	8	9	10		
Li	Be									B	C	N	O	F	Ne		
6.941	9.012									10.81	12.01	14.01	16.00	19.00	20.18		
11	12	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Na	Mg	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	Al	Si	P	S	Cl	Ar
22.99	24.31											26.98	28.09	30.97	32.07	35.45	39.95
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
39.10	40.08	44.96	47.88	50.94	52.00	54.94	55.85	58.93	58.69	63.55	65.39	69.72	72.61	74.92	78.96	79.90	83.80
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
85.47	87.62	88.91	91.22	92.91	95.94	(98)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
132.9	137.3	138.9	178.5	180.9	183.8	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)
87	88	89	104	105	106	107	108	109	110	111	112		114		116		118
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub		Uuq		Uuh		Uuo
(223)	(226)	(227)	(261)	(262)	(263)	(262)	(265)	(266)	(269)	(272)	(277)		(???)		(???)		(???)

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
140.1	140.9	144.2	(145)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
232.0	231.0	238.0	(237)	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(262)

DIRECTIONS

- When you have selected your answer to each question, blacken the corresponding space on the answer sheet using a soft, #2 pencil. Make a heavy, full mark, but no stray marks. If you decide to change an answer, erase the unwanted mark very carefully.
- There is only one correct answer to each question. Any questions for which more than one response has been blackened **will not be counted**.
- Your score is based solely on the number of questions you answer correctly. **It is to your advantage to answer every question.**

1. Which element is a liquid at 25 °C and 1.0 atm?

- (A) bromine (B) krypton
(C) phosphorus (D) xenon

2. Which pair of aqueous solutions produce a yellow precipitate upon mixing?

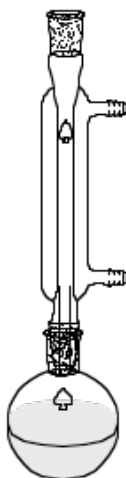
- (A) AlCl₃ and KOH (B) Ba(NO₃)₂ and Na₂SO₄
(C) Cu(NO₃)₂ and NaClO₄ (D) Pb(C₂H₃O₂)₂ and KI

3. A student wishes to determine the thickness of a rectangular piece of aluminum foil but cannot measure it directly. She can measure its density (d), length (l), mass (m) and width (w). Which relationship will give the thickness?

- (A) $\frac{m}{d \cdot l \cdot w}$ (B) $\frac{m \cdot l \cdot w}{d}$
(C) $\frac{d \cdot l \cdot w}{m}$ (D) $\frac{d \cdot m}{l \cdot w}$

4. The apparatus shown would be used to

- (A) distill a liquid.
(B) reflux a solution.
(C) filter a precipitate.
(D) chromatograph a mixture.



5. Which element is the major component in solar cells?

- (A) As (B) Ge (C) P (D) Si

6. Which procedure is recommended for reading the level of an aqueous solution in a buret or graduated cylinder?

- (A) Keep the eye level with the bottom of the meniscus and record that reading.
(B) Keep the eye level with the top of the meniscus and record that reading.
(C) Look down at the meniscus at an angle to obtain the average reading directly.
(D) Read both the bottom and top of the meniscus and average those readings.

7. A 1.0 gram sample of which substance contains the largest number of molecules?

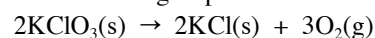
- (A) COCl₂ (B) CS₂ (C) CH₃Cl (D) C₂H₂F₂

8. How many moles of ions are present in 250 mL of a 4.4 M solution of sodium sulfate?

- (A) 1.1 (B) 2.2 (C) 3.3 (D) 13

9. How many moles of oxygen gas are produced by the decomposition of 245 g of potassium chlorate?

Molar Mass / g·mol ⁻¹	
KClO ₃	122.6



- (A) 1.50 (B) 2.00 (C) 2.50 (D) 3.00

10. A 50.0 mL solution of 0.150 M HCl is mixed with 25.0 mL of 0.400 M HCl. What is the HCl concentration in the final solution? (Assume volumes are additive.)

- (A) 0.0175 (B) 0.233 (C) 0.275 (D) 0.550

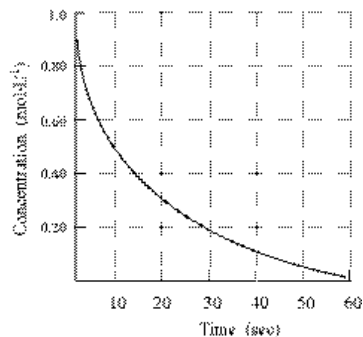
11. For the reaction: 2X + 3Y → 3Z, the combination of 2.00 moles of X with 2.00 moles of Y produces 1.75 moles of Z. What is the percent yield of this reaction?

- (A) 43.8% (B) 58.3% (C) 66.7% (D) 87.5%

12. For which property is the value greater for a solution of a nonvolatile solute than for the pure solvent?

- (A) boiling point (B) freezing point
(C) triple point (D) vapor pressure

13. Liquids exhibit all these properties **except**
- (A) definite volume. (B) definite shape.
(C) incompressibility. (D) slow diffusion.
14. Which statement is true about a substance that is subjected to a lower external pressure at a constant temperature?
- (A) A liquid will boil at a lower temperature.
(B) A liquid will exhibit a lower vapor pressure.
(C) A gas in an insulated container will change into a liquid.
(D) A gas in a nonrigid container will exhibit a smaller volume
15. A flask contains a mixture of Ne(g) and Ar(g). There are 0.250 mol of Ne(g) which exerts a pressure of 205 mmHg. If the Ar(g) exerts a pressure of 492 mmHg, what mass of Ar(g) is in the flask?
- (A) 4.16 g (B) 12.1 g
(C) 24.0 g (D) 95.9 g
16. A gas in a closed, flexible container is slowly cooled from 50 °C to 25 °C. What is the ratio of the final volume of the gas to its initial volume? Assume ideal behavior.
- (A) 2/1 (B) 1.08/1 (C) 0.923/1 (D) 0.5/1
17. The value of which property decreases with an increase in the strength of intermolecular forces?
- (A) viscosity (B) boiling point
(C) surface tension (D) vapor pressure
18. A white solid dissolves in water to form a solution that does not conduct electricity. What type of bonding is most likely present in the solid?
- (A) ionic (B) metallic
(C) network covalent (D) polar covalent
19. Which statement is always true for an exothermic reaction?
- (A) The enthalpy change is negative.
(B) The entropy change is negative.
(C) The reaction absorbs heat from the surroundings.
(D) The reaction is spontaneous.
20. For which reaction is $\Delta H_{\text{rxn}}^\circ$ equal to ΔH_f° for $\text{CuSO}_4(\text{s})$?
- (A) $\text{Cu}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{CuSO}_4(\text{s})$
(B) $\text{CuO}(\text{s}) + \text{SO}_3(\text{g}) \rightarrow \text{CuSO}_4(\text{s})$
(C) $\text{CuS}(\text{s}) + 2\text{O}_2(\text{g}) \rightarrow \text{CuSO}_4(\text{s})$
(D) $\text{Cu}(\text{s}) + \text{S}(\text{s}) + 2\text{O}_2(\text{g}) \rightarrow \text{CuSO}_4(\text{s})$
21. What is the value of ΔH° (in kJ) for this reaction?
- | | $\Delta H_f^\circ / \text{kJ}\cdot\text{mol}^{-1}$ |
|-----------------------|--|
| CuO | -156.1 |
| Cu_2O | -170.7 |
- $2\text{CuO}(\text{s}) \rightarrow \text{Cu}_2\text{O}(\text{s}) + \frac{1}{2}\text{O}_2(\text{g})$
- (A) 141.5 (B) 14.6 (C) -14.6 (D) -141.5
22. When the substances Na(s), $\text{Br}_2(\text{g})$, $\text{Br}_2(\text{l})$, NaBr(s) are arranged in order of increasing molar entropy at 25 °C, which order is correct?
- (A) $\text{Br}_2(\text{g})$, $\text{Br}_2(\text{l})$, Na(s), NaBr(s)
(B) Na(s), $\text{Br}_2(\text{g})$, $\text{Br}_2(\text{l})$, NaBr(s)
(C) Na(s), NaBr(s), $\text{Br}_2(\text{l})$, $\text{Br}_2(\text{g})$
(D) NaBr(s), $\text{Br}_2(\text{g})$, $\text{Br}_2(\text{l})$, Na(s)
23. The reaction; $4\text{Ag}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{Ag}_2\text{O}(\text{s})$, is exothermic. Which statement about the reaction is correct?
- (A) It is spontaneous at all temperatures.
(B) It is spontaneous only at low temperatures.
(C) It is spontaneous only at high temperatures.
(D) It is non-spontaneous at all temperatures.
24. For a reaction at 25 °C, $\Delta G^\circ = -33.3 \text{ kJ}$ and $\Delta S^\circ = -198 \text{ J}\cdot\text{K}^{-1}$. What is the value of ΔH° ?
- (A) -92.3 kJ (B) -38.3 kJ
(C) -28.8 kJ (D) 25.7 kJ
25. According to the graph what is the rate of disappearance of the reactant at 10 seconds?



- (A) $0.025 \text{ mol}\cdot\text{L}^{-1}\cdot\text{sec}^{-1}$ (B) $0.050 \text{ mol}\cdot\text{L}^{-1}\cdot\text{sec}^{-1}$
(C) $0.40 \text{ mol}\cdot\text{L}^{-1}\cdot\text{sec}^{-1}$ (D) $0.80 \text{ mol}\cdot\text{L}^{-1}\cdot\text{sec}^{-1}$

26. For the reaction, $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$, how does the rate of disappearance of O_2 compare to the rate of production of CO_2 ? The rate of disappearance of O_2 is
- (A) the same as the rate of production of CO_2 .
 (B) 1/5 the rate of production of CO_2 .
 (C) 3/5 the rate of production of CO_2 .
 (D) 5/3 the rate of production of CO_2 .
27. When the concentration of a particular reactant is tripled and the initial rate of the reaction increases by a factor of nine, what is the order of the reaction with respect to this reactant?
- (A) zero (B) one (C) two (D) three
28. A substance, X, undergoes a first order reaction $X \rightarrow Y$ with a half life of 20 minutes. If the initial concentration of X is 2.0 M, what will its concentration be after 40 minutes?
- (A) 0.25 M (B) 0.50 M (C) 1.0 M (D) 1.4 M
29. The chemicals in a lightstick give off light as they react. When the lightstick is placed in warm water the glow increases. This is because the
- (A) activation energy for the process is lowered.
 (B) average kinetic energy of the reactants increases.
 (C) higher temperature catalyzes the reaction.
 (D) higher temperature changes the wavelength of light emitted.
30. Under certain conditions the reaction of CO with NO_2 to give CO_2 and NO results in the rate law;
 $rate = k[CO][NO_2]$.
 What are the units for the rate constant, k ?
- (A) $mol \cdot L^{-1} \cdot min^{-1}$ (B) $mol^2 \cdot L^{-2} \cdot min^{-1}$
 (C) $L \cdot mol^{-1} \cdot min^{-1}$ (D) $L^2 \cdot mol^{-2} \cdot min^{-1}$
31. Which statement is correct about a system at equilibrium?
- (A) The forward and reverse reactions occur at identical rates.
 (B) The concentrations of reactants must equal the concentrations of the products.
 (C) The concentrations of reactants and products can be changed by adding a catalyst.
 (D) The concentrations of reactants and products are not affected by a change in temperature.
32. For which reaction at equilibrium will an decrease in volume at constant temperature cause a decrease in the amount of product?
- (A) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
 (B) $HCl(g) + H_2O(l) \rightleftharpoons H_3O^+(aq) + Cl^-(aq)$
 (C) $Fe_3O_4(s) + 4H_2(g) \rightleftharpoons 3Fe(s) + 4H_2O(g)$
 (D) $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
33. What is the conjugate base of HSO_4^- ?
- (A) H^+ (B) H_2SO_4 (C) OH^- (D) SO_4^{2-}
34. The K_a of hydrocyanic acid, HCN, is 5.0×10^{-10} . What is the pH of 0.050 M HCN(aq)?
- (A) between 3.5 and 4.5 (B) between 5.0 and 5.5
 (C) between 9.0 and 9.5 (D) between 10.5 and 11.0
35. Which pair of solutions forms a buffer solution when equal volumes of each are mixed?
- (A) 0.20 M HCl and 0.20 M NaOH
 (B) 0.40 M $HC_2H_3O_2$ and 0.20 M NaOH
 (C) 0.20 M HCl and 0.20 M NH_3
 (D) 0.40 M HCl and 0.20 M NH_3
36. Which statement is correct about the initial precipitate that forms when a 0.10 M NaF solution is added slowly to a solution that is 0.10 M with respect to both $Ca(NO_3)_2$ and $Mg(NO_3)_2$?
- | | K_{sp} |
|---------|-----------------------|
| CaF_2 | 4.0×10^{-11} |
| MgF_2 | 6.4×10^{-9} |
- (A) The initial precipitate will contain CaF_2 only.
 (B) The initial precipitate will contain MgF_2 only.
 (C) The initial precipitate will contain both CaF_2 and MgF_2 with more CaF_2 .
 (D) The initial precipitate will contain both CaF_2 and MgF_2 with more MgF_2 .
37. Which range includes the average oxidation state of S in $Na_2S_4O_6$?
- (A) less than 0 (B) 0 to +2
 (C) +2 to +4 (D) greater than +4

38. For a stoichiometric mixture of reactants, which statement best describes the changes that occur when this reaction goes to completion?



- (A) All of the zinc is oxidized and some of the nitrogen is reduced.
 (B) All of the zinc is oxidized and all of the nitrogen is reduced.
 (C) Some of the zinc is oxidized and all of the nitrogen is reduced.
 (D) Some of the zinc is oxidized and some of the nitrogen is reduced.

39. Which occurs at the anode of any voltaic cell?

- I. A metal electrode dissolves.
 II. A substance undergoes oxidation.
 III. Positive ions are deposited from the solution.

- (A) I only (B) II only
 (C) I and II only (D) I and III only
40. What is the coefficient for O_2 when the equation

$$\text{NH}_3 + \text{O}_2 \rightarrow \text{NO} + \text{H}_2\text{O}$$
 is balanced with smallest whole number coefficients?
 (A) 2 (B) 3 (C) 4 (D) 5

41. What is the standard cell potential for the voltaic cell:
 $\text{Cr} \mid \text{Cr}^{3+} \parallel \text{Pb}^{2+} \mid \text{Pb} ?$

	$E^\circ_{\text{red}} / \text{V}$
$\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb}$	-0.13
$\text{Cr}^{3+} + 3\text{e}^- \rightarrow \text{Cr}$	-0.74

- (A) 1.09 (B) 0.61 (C) -0.61 (D) -1.09
42. During the electrolysis of an aqueous solution of AgNO_3 , what would happen to the mass of silver metal deposited if the current is doubled and the electrolysis time is decreased to $\frac{1}{2}$ of its initial value?
 (A) It would stay the same.
 (B) It would increase to twice its initial value.
 (C) It would decrease to $\frac{1}{4}$ of its initial value.
 (D) It would decrease to $\frac{1}{2}$ of its initial value.
43. Which type of radiation has the highest frequency?
 (A) infrared (B) microwave
 (C) ultraviolet (D) X-ray
44. How many orbitals have the quantum numbers:
 $n = 4, \ell = 3, m_\ell = 0$
 (A) 7 (B) 3 (C) 1 (D) 0

45. What is the ground state electron configuration of a ${}_{27}\text{Co}$ atom in the gas phase?

- (A) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$
 (B) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$
 (C) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^1$
 (D) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$

46. Which equation represents the first ionization of calcium?

- (A) $\text{Ca}(\text{s}) \rightarrow \text{Ca}^+(\text{g}) + \text{e}^-$
 (B) $\text{Ca}(\text{g}) \rightarrow \text{Ca}^+(\text{g}) + \text{e}^-$
 (C) $\text{Ca}^+(\text{g}) \rightarrow \text{Ca}^{2+}(\text{g}) + \text{e}^-$
 (D) $\text{Ca}^{2+}(\text{g}) + \text{e}^- \rightarrow \text{Ca}^+(\text{g})$

47. Electronegativities change both down a group and across a period. In general these changes are to:

	down a group	across a period from left to right
(A)	increase	increase
(B)	increase	decrease
(C)	decrease	increase
(D)	decrease	decrease

48. When the atoms: Ba, Cs, Mg, Na are arranged in order of increasing size, what is the correct order?

- (A) $\text{Cs} < \text{Na} < \text{Mg} < \text{Ba}$ (B) $\text{Mg} < \text{Na} < \text{Ba} < \text{Cs}$
 (C) $\text{Mg} < \text{Ba} < \text{Na} < \text{Cs}$ (D) $\text{Ba} < \text{Mg} < \text{Na} < \text{Cs}$

49. What is the total number of valence electrons in the thiosulfate ion, $\text{S}_2\text{O}_3^{2-}$?

- (A) 28 (B) 30 (C) 32 (D) 34

50. For which species is the electron pair geometry around the central atom of the Lewis dot structure the same as the geometry of the atoms?

- (A) CO_2 (B) SO_2 (C) BrO_2^- (D) NO_2^-

51. Which molecule is least stable?

- (A) OF_2 (B) OF_4 (C) SF_2 (D) SF_4

52. In which choice are the molecules listed in order of increasing bond angle?

- (A) $\text{H}_2\text{O}, \text{CH}_4, \text{NH}_3$ (B) $\text{CH}_4, \text{NH}_3, \text{H}_2\text{O}$
 (C) $\text{H}_2\text{O}, \text{NH}_3, \text{CH}_4$ (D) $\text{NH}_3, \text{CH}_4, \text{H}_2\text{O}$

53. What is the shape of the ClF_3 molecule?
- (A) trigonal planar (B) trigonal pyramidal
(C) T-shaped (D) tetrahedral
54. In which choice are the sodium halides listed in order of increasing lattice energy?
- (A) NaF, NaCl, NaBr (B) NaBr, NaCl, NaF
(C) NaCl, NaF, NaBr (D) NaCl, NaBr, NaF
55. How many sigma bonds are in a molecule of diethyl ether, $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$?
- (A) 14 (B) 12 (C) 8 (D) 4
56. Which term describes the formation of acetic acid from ethyl alcohol?
- (A) addition (B) esterification
(C) neutralization (D) oxidation
57. How many structural isomers have the formula C_5H_{12} ?
- (A) 2 (B) 3 (C) 4 (D) 5
58. Which class of compounds does not include $\text{C}=\text{O}$ double bonds in its molecules?
- (A) esters (B) amides
(C) alcohols (D) acids
59. What is the hybridization of the carbon atoms of C_2H_4 (ethene)?
- (A) sp (B) sp^2 (C) sp^3 (D) s^2p^2
60. Which structure represents a peptide bond?
- (A) $\begin{array}{c} \text{O} \quad \text{H} \\ \parallel \quad | \\ -\text{C}-\text{N}- \end{array}$ (B) $\begin{array}{c} \text{N} \quad \text{H} \\ \parallel \quad | \\ -\text{C}-\text{O} \end{array}$
(C) $\begin{array}{c} | \quad \quad \text{H} \\ | \quad \quad | \\ -\text{C}-\text{O}-\text{N}- \end{array}$ (D) $\begin{array}{c} | \quad \quad \text{H} \\ | \quad \quad | \\ -\text{C}-\text{N}-\text{O}- \end{array}$

END OF TEST

Olympiad 2008 Local Section

KEY

Number	Answer	Number	Answer
1.	A	31.	A
2.	D	32.	D
3.	A	33.	D
4.	B	34.	B
5.	D	35.	B
6.	A	36.	A
7.	C	37.	C
8.	C	38.	A
9.	D	39.	B
10.	B	40.	D
11.	D	41.	B
12.	A	42.	A
13.	B	43.	D
14.	A	44.	C
15.	C	45.	D
16.	C	46.	B
17.	D	47.	C
18.	D	48.	B
19.	A	49.	C
20.	D	50.	A
21.	A	51.	B
22.	C	52.	C
23.	B	53.	C
24.	A	54.	B
25.	A	55.	A
26.	D	56.	D
27.	C	57.	B
28.	B	58.	C
29.	B	59.	B
30.	C	60.	A