Klein, Organic Chemistry 3e
Chapter 1

1. Chemical reactions occur as a result of _____

A. the attraction between opposite charges.
B. the nucleus–nucleus interactions.
C. the motion of electrons.
D. like atoms interacting.
E. combining two chemicals.

Answer: C
Learning Objective: 1.1 Compare and contrast organic and inorganic compounds
Difficulty: Easy

2. From the following, identify the item which does not contain organic compounds.

A. medicine
B. socks
C. a plant
D. a coin
E. a plastic cup

Answer: D
Learning Objective: 1.1 Compare and contrast organic and inorganic compounds
Difficulty: Easy

3. What is the difference between inorganic and organic compounds?

A. organic compounds do not contain carbon
B. organic compounds contain carbon
C. organic compounds are without pesticides
D. inorganic compounds contain carbon
E. inorganic compounds are composed exclusively of transition metal elements

Answer: B
Learning Objective: 1.1 Compare and contrast organic and inorganic compounds
Difficulty: Easy

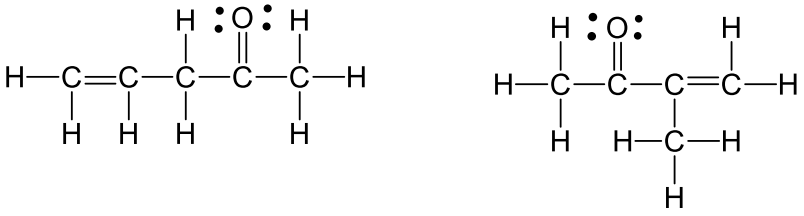
4. Constitutional isomers do not differ in _____.

A. physical properties
B. atomic connectivity

C. molecular formula
D. name
E. constitution

Answer: C
Learning Objective: 1.2 Describe structural theory of matter, molecular formula and structural formula
Difficulty: Easy

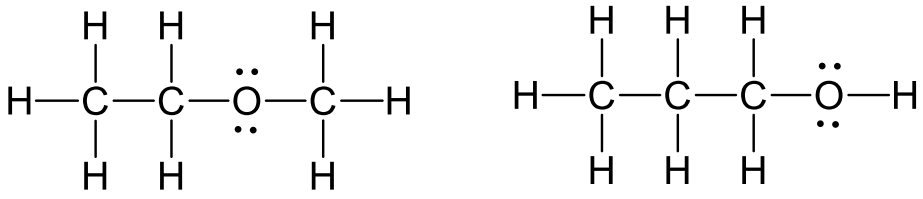
5. What is the relationship between the following compounds?



A. isotopes
B. constitutional isomers
C. the same structure
D. composed of different elements
E. no relationship

Answer: B
Learning Objective: 1.2 Describe structural theory of matter, molecular formula and structural formula
Difficulty: Easy

6. What is the relationship between the following compounds?



A. resonance isomers
B. constitutional isomers
C. empirical isomers
D. There is no relationship

Answer: B

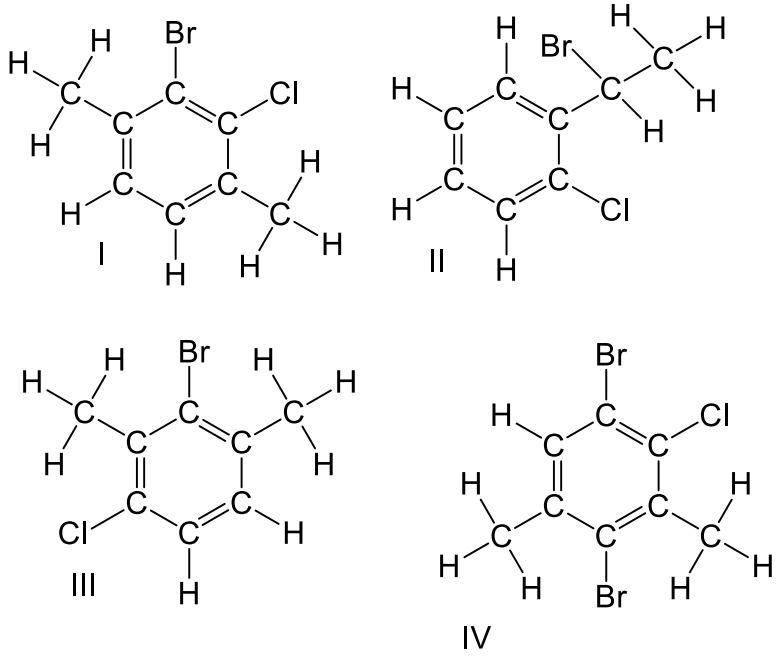
Learning Objective: 1.2 Describe structural theory of matter, molecular formula and structural formula
Difficulty: Easy

7. Carbon is considered to be _____.

A. tetravalent
B. divalent
C. trivalent
D. monovalent
E. pentavalent

Answer: A
Learning Objective: 1.2 Describe structural theory of matter, molecular formula and structural formula
Difficulty: Easy

8. Which of the following compounds are constitutional isomers of each other?

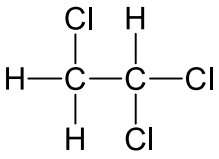


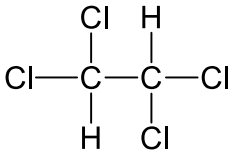
A. I and II
B. III and IV
C. I, II and IV
D. II, III and IV
E. I, II, and III

Answer: E

Learning Objective: 1.2 Describe structural theory of matter, molecular formula and structural formula
Difficulty: Medium

9. Which of the following compounds are constitutional isomers of each other?


I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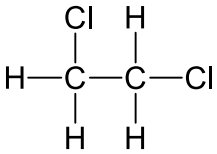
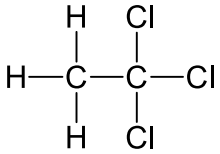

III

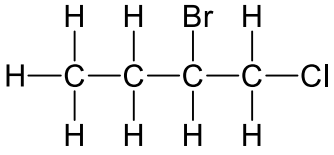

IV

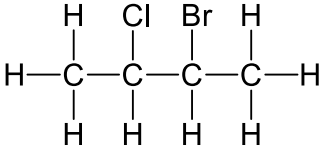
A. I and II
B. III and IV
C. II and III
D. I and IV
E. All of these

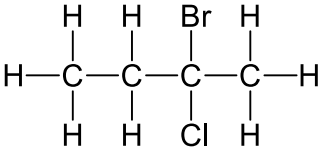
Answer: D
Learning Objective: 1.2 Describe structural theory of matter, molecular formula and structural formula
Difficulty: Medium

10. Draw three constitutional isomers that have molecular formula C_4H_8BrCl

Answer:





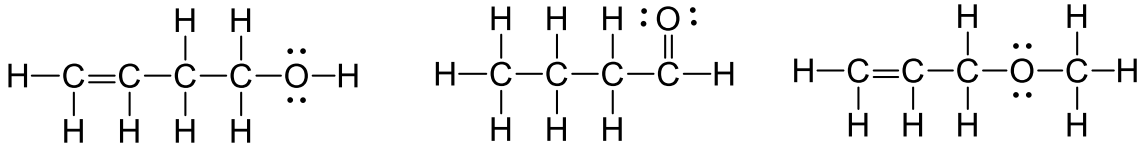


There are additional correct answers.

Learning Objective: 1.2 Describe structural theory of matter, molecular formula and structural formula
Difficulty: Medium

11. Draw three constitutional isomers that have molecular formula C_4H_8O.

Answer:



There are additional correct answers

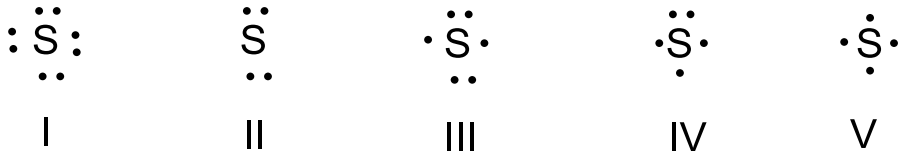
Learning Objective: 1.2 Describe structural theory of matter, molecular formula and structural formula
Difficulty: Hard

12. What force is NOT taken into account in the formation of a covalent bond?

A. repulsion between two positively charged nuclei
B. force of attraction between positively charged nuclei and negatively charged electrons
C. repulsion between two negatively charged nuclei
D. repulsion between positively charged nuclei and negatively charged electrons

Answer: D
Learning Objective: 1.3 Define covalent bond, valence electrons, octet rule, and lone pair
Difficulty: Easy

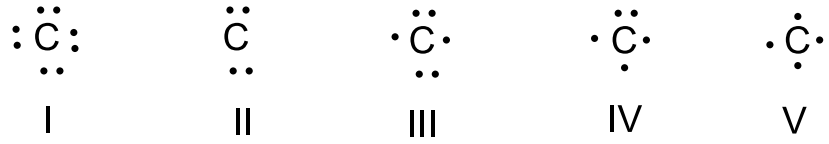
13. What is the correct Lewis dot structure for S?



A. I
B. II
C. III
D. IV
E. V

Answer: C
Learning Objective: 1.3 Define covalent bond, valence electrons, octet rule, and lone pair
Difficulty: Easy

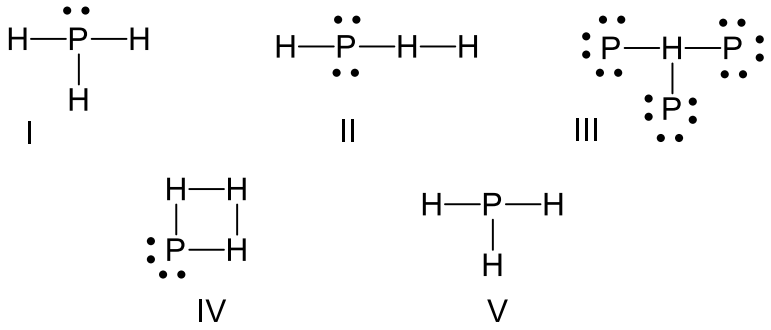
14. What is the correct Lewis dot structure for C?



A. I
B. II
C. III
D. IV
E. V

Answer: E
Learning Objective: 1.3 Define covalent bond, valence electrons, octet rule, and lone pair
Difficulty: Easy

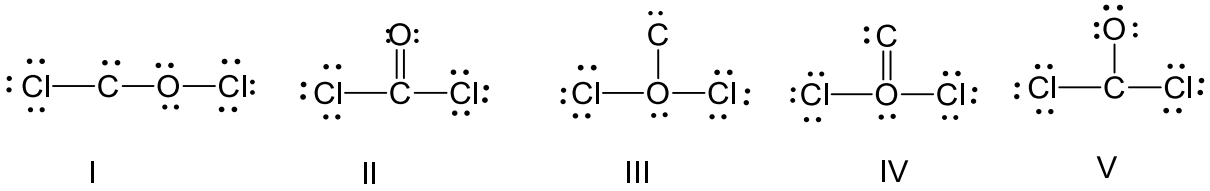
15. What is the correct Lewis structure for PH_3?



A. I
B. II
C. III
D. IV
E. V

Answer: A
Learning Objective: 1.3 Define covalent bond, valence electrons, octet rule, and lone pair
Difficulty: Easy

16. What is the correct Lewis structure for $COCl_2$?

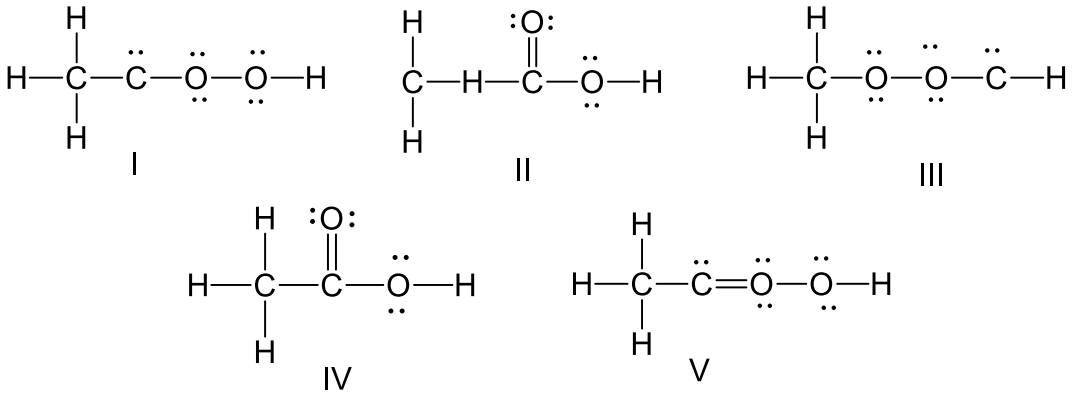


I II III IV V

A. I
B. II
C. III
D. IV
E. V

Answer: B
Learning Objective: 1.3 Define covalent bond, valence electrons, octet rule, and lone pair
Difficulty: Hard

17. What is the correct Lewis structure for CH_3CO_2H?



I II III IV V

A. I
B. II
C. III
D. IV
E. V

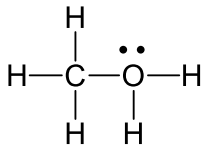
Answer: D
Learning Objective: 1.3 Define covalent bond, valence electrons, octet rule, and lone pair
Difficulty: Hard

18. Which of the following compounds has two lone pairs on the central atom?

A. CO_2
B. SCl_2
C. NF_3
D. CS_2
E. SO_3

Answer: B
Learning Objective: 1.3 Define covalent bond, valence electrons, octet rule, and lone pair
Difficulty: Medium

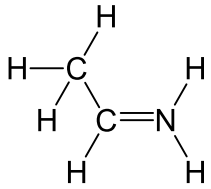
19. What is the formal charge on oxygen in the following structure?



A. 2-
B. 1-
C. 2+
D. 1+
E. 0

Answer: D
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Easy

20. What is the formal charge on nitrogen in the following structure?

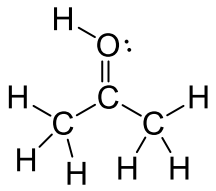


A. 2-
B. 1-
C. 2+
D. 1+

E. 0

Answer: D
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Easy

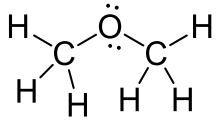
21. What is the formal charge on oxygen in the following structure?



A. 0
B. 1+
C. 2+
D. 1-
E. 2-

Answer: B
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Easy

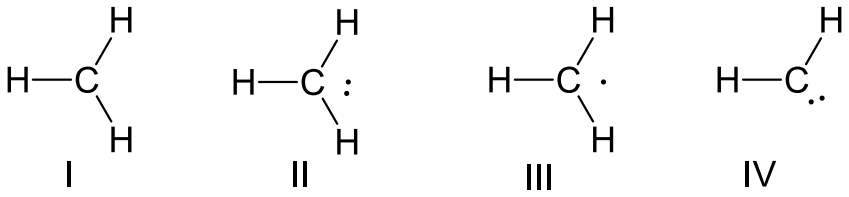
22. What is the formal charge on oxygen in the following structure?



A. 2+
B. 2-
C. 1+
D. 1-
E. 0

Answer: E
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Easy

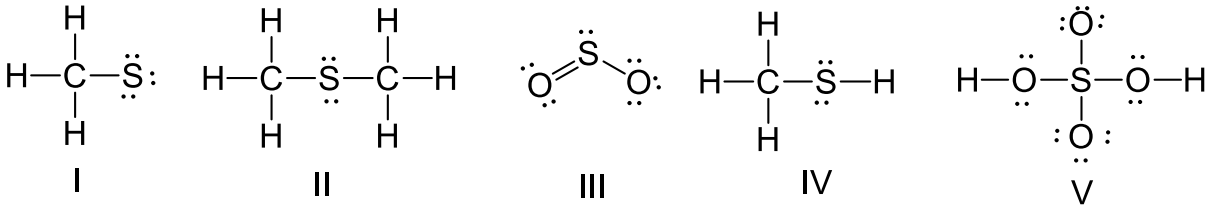
23. Which of the following structures have a zero formal charge on the carbon atom?



A. I and III
B. II and III
C. III and IV
D. I and IV
E. II and IV

Answer: C
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

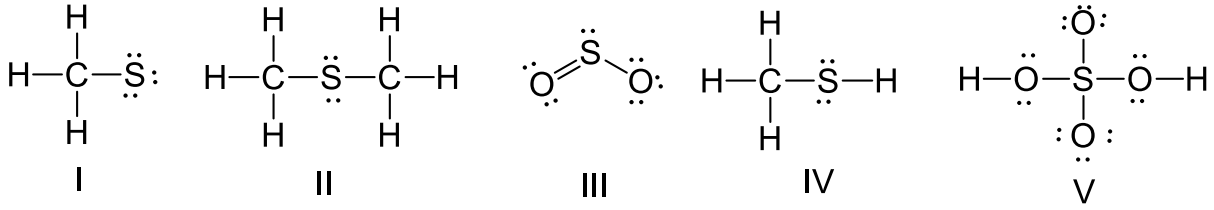
24. Which of the following structures have a 1- formal charge on the sulfur atom?



A. I
B. II
C. III
D. IV
E. V

Answer: A
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Easy

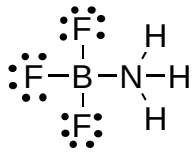
25. Which of the following structures have a 1+ formal charge on the sulfur atom?



A. I
B. II
C. III
D. IV
E. V

Answer: C
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Easy

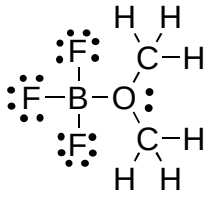
26. What are the formal charges on boron and fluorine in the following structure?



A. B = 1+, N = 1+
B. B = 1+, N = 1-
C. B = 1-, N = 1-
D. B = 1-, N = 1+
E. B = 1-, N = 0

Answer: D
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

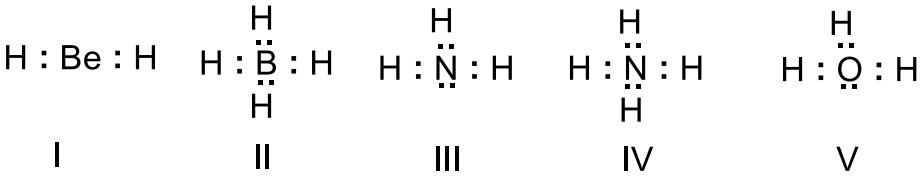
27. What are the formal charges on boron and oxygen in the following structure?



A. B = 1-, O = 1-
B. B = 1-, O = 1+
C. B = 1+, O = 1+
D. B = 1+, O = 1-
E. B = 1-, O = 0

Answer: B
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

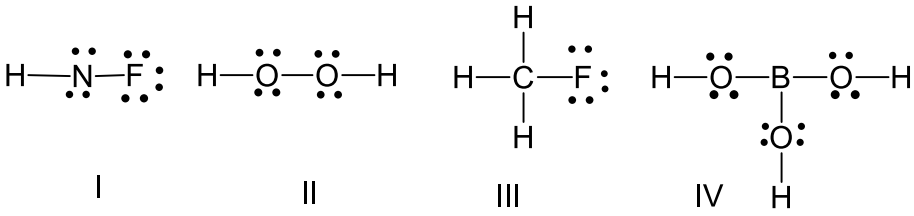
28. Which of the following structures have 1+ formal charge on the central atom?



A. I
B. II
C. III
D. III and V
E. IV and V

Answer: E
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

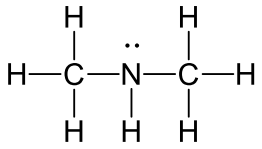
29. Which of the following structures have a formal charge on at least one atom?



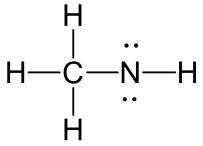
A. I
B. II
C. III
D. IV
E. None of these

Answer: A
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

30. Which of the following structures have a 1- formal charge on the nitrogen atom?



I



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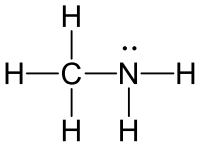

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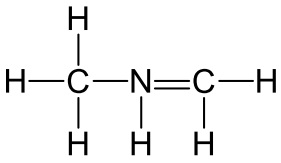
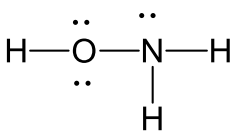


IV



V

A. I
B. II
C. III
D. IV
E. V

Answer: B
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

31. The bonding pattern of oxygen with a formal charge of –1 could be described as _____.

A. one lone pair of electrons and three single bonds
B. two lone pairs of electrons and two single bonds
C. three lone pairs of electrons, and one single bond
D. one lone pair of electrons, one single, and one double bond
E. zero lone pairs, and two single and one double bond

Answer: C

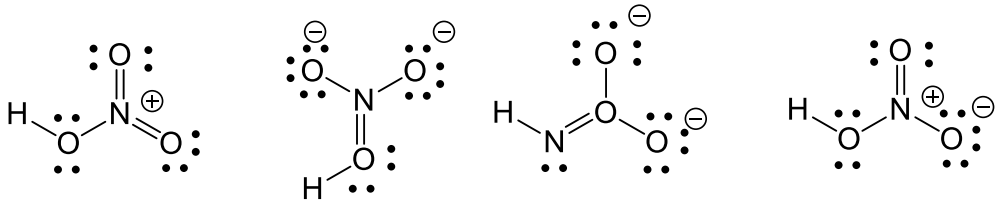
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

32. In an ammonium ion, nitrogen has a valence of 4, and zero nonbonding electrons. What is the correct formal charge of nitrogen with 4 covalent bonds?

A. 2-
B. 2+
C. 1-
D. 1+
E. 0

Answer: D
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

33. What is the correct Lewis structure for nitric acid, HNO_3, including the formal charges?

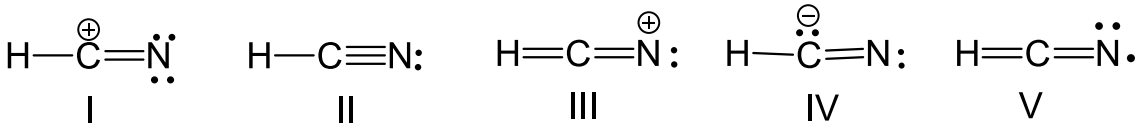


I II III IV

A. I
B. II
C. III
D. IV
E. None of these

Answer: D
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

34. What is the correct Lewis structure for hydrocyanic acid, HCN, including the formal charges, if any?

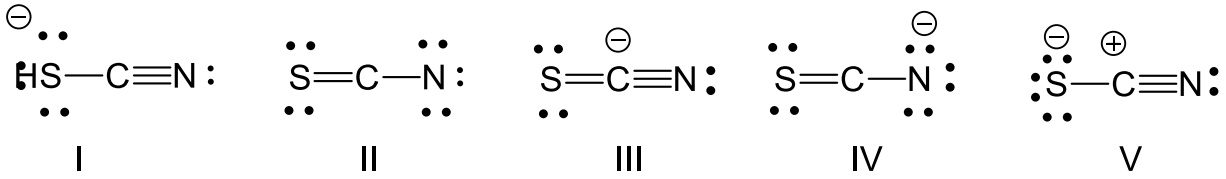


I II III IV V

A. I
B. II
C. III
D. IV
E. V

Answer: B
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Hard

35. What is the correct Lewis structure for SCN^- including the formal charges, if any?

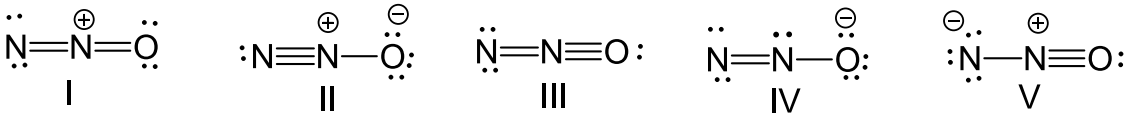


I II III IV V

A. I
B. II
C. III
D. IV
E. V

Answer: A
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Hard

36. What is the correct Lewis structure for N_2O including the formal charges, if any?



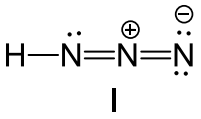
I II III IV V

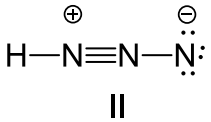
A. I
B. II

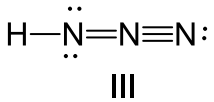
C. III
D. IV
E. V

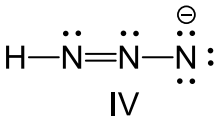
Answer: B
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Hard

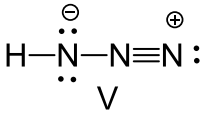
37. What is the correct Lewis structure for hydrazoic acid, HN_3, including the formal charges, if any?


I


II


III


IV

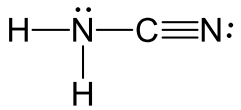

V

A. I
B. II
C. III
D. IV
E. V

Answer: A
Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Hard

38. Draw the Lewis structure for NH_2CN including formal charges, if any?

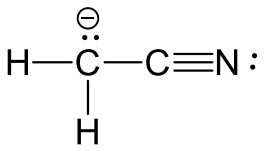
Answer:



Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

39. Draw the Lewis structure for $^{-}CH_2CN$ including formal charges?

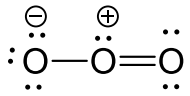
Answer:



Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

40. Draw the Lewis structure for ozone, O_3, including formal charges, if any?

Answer:



Learning Objective: 1.4 Define formal charge and describe how formal charge is calculated
Difficulty: Medium

41. The electronegativity of elements on the periodic table tends to increase_____.

A. from left to right, top to bottom
B. from right to left, bottom to top
C. from left to right, bottom to top
D. from right to left, top to bottom
E. from upper right to lower left

Answer: C
Learning Objective: 1.5 Describe the relationship between electronegativity and covalent, polar covalent, and ionic bonds
Difficulty: Easy

42. Which of the following is the least electronegative element?

A. B
B. C

C. N
D. O
E. F

Answer: A
Learning Objective: 1.5 Describe the relationship between electronegativity and covalent, polar covalent, and ionic bonds
Difficulty: Easy

43. Which of the following is the most electronegative element?

A. B
B. C
C. N
D. O
E. H

Answer: D
Learning Objective: 1.5 Describe the relationship between electronegativity and covalent, polar covalent, and ionic bonds
Difficulty: Easy

44. Which of the following is the least electronegative element?

A. P
B. N
C. Mg
D. Si
E. K

Answer: E
Learning Objective: 1.5 Describe the relationship between electronegativity and covalent, polar covalent, and ionic bonds
Difficulty: Easy

45. Which of the following is the most electronegative element?

A. P
B. N
C. S
D. O
E. F