Lewis Electron Dot Structures

Activity 1 – Counting Valence Electrons
Question Group 1
Question 1
Determine the number of valence electrons (i.e., outer shell electrons) in CS_2.

Question 2
Determine the number of valence electrons (i.e., outer shell electrons) in CO_2.

Question Group 2
Question 3
Determine the number of valence electrons (i.e., outer shell electrons) in CCl_4.

Question 4
Determine the number of valence electrons (i.e., outer shell electrons) in CF_4.

Question Group 3
Question 5
Determine the number of valence electrons (i.e., outer shell electrons) in O_3.

Question 6
Determine the number of valence electrons (i.e., outer shell electrons) in SO_2.

Question Group 4
Question 7
Determine the number of valence electrons (i.e., outer shell electrons) in BH_3.

Question 8
Determine the number of valence electrons (i.e., outer shell electrons) in CH_4.

Question Group 5
Question 9
Determine the number of valence electrons (i.e., outer shell electrons) in H_2O.

Question 10
Determine the number of valence electrons (i.e., outer shell electrons) in H_2S.

Question Group 6
Question 11
Determine the number of valence electrons (i.e., outer shell electrons) in SF_6.
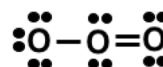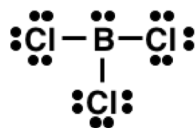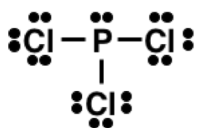
Question 12
Determine the number of valence electrons (i.e., outer shell electrons) in XeF_4.

Activity 2 – Master Configurator
Question Group 7
Question 13
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

BH_3 O_3 PCl_3
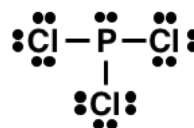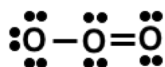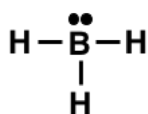
Question 14
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

PCl_3 BCl_3 O_3

Question 15

Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
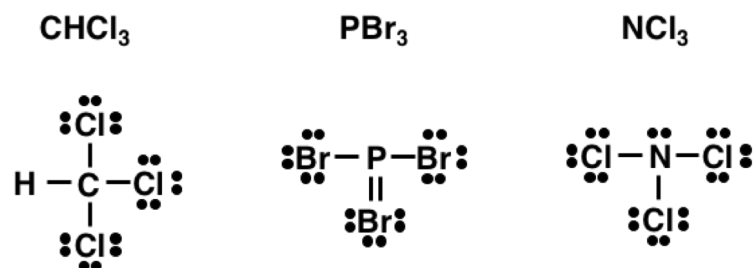
$CHCl_3$ PBr_3 NCl_3

Question Group 8
Question 16

Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

PCl_3 $CHCl_3$ N_2

Question 17

Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
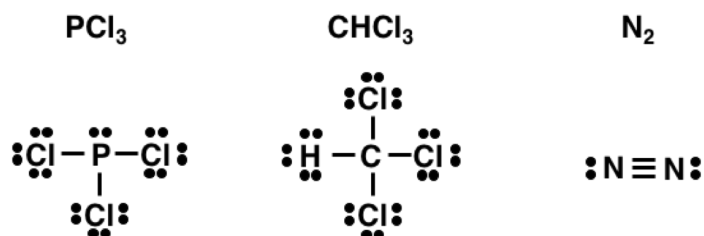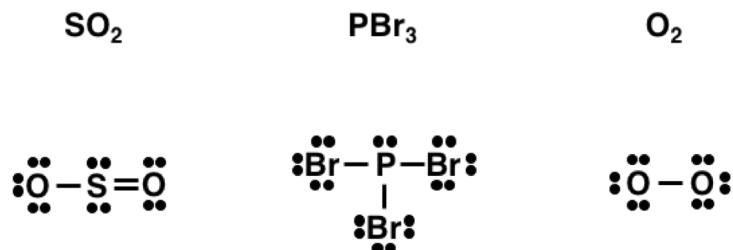
SO_2 PBr_3 O_2

Question 18
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

SO_2 PBr_3 O_2

:Ö–S̈=Ö   :B̈r–P̈–B̈r: :Ö–Ö:
                          |
                         :B̈r:

Question Group 9
Question 19
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
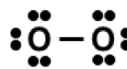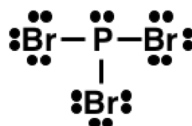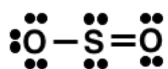
$CHCl_3$ SO_2 PCl_3

:C̈l: :C̈l–P–C̈l:
 | :Ö–S̈=Ö   ‖
H–C–C̈l: :C̈l:
 |
:C̈l:
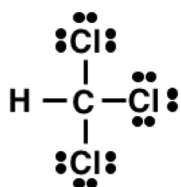
Question 20
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
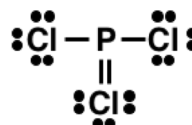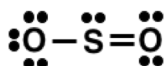
O_3 NF_3 $CHCl_3$

:Ö–Ö–Ö: :F̈–N–F̈:   :C̈l:
                              ‖ |
                             :F̈:   H–C–C̈l:
                                                     |
                                                    :C̈l:

Question 21
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
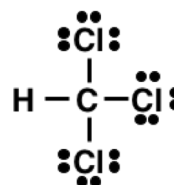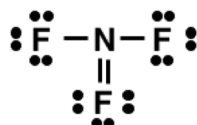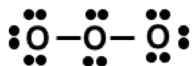
CH_2Cl_2 SO_2 NF_3

Structure for CH_2Cl_2:

```
      ••
     :Cl:
      |
  ••        ••
 :H—C—H:
  ••  |     ••
     :Cl:
      ••
```

Structure for SO_2:

```
  ••    ••    ••
 :O—S=O
  ••    ••    ••
```

Structure for NF_3:

```
  ••    ••    ••
 :F—N—F:
  ••    |     ••
       :F:
        ••
```

Question Group 10
Question 22
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
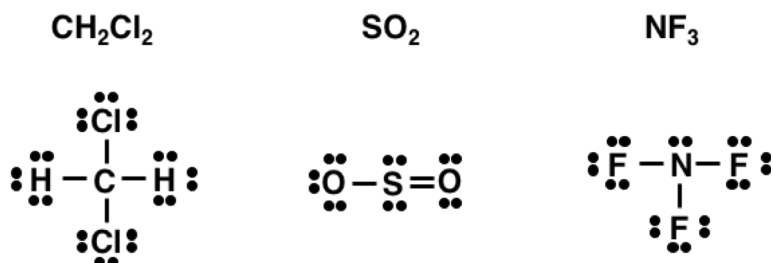
CCl_4 SCl_2 NCl_3

Structure for CCl_4:

```
      ••
     :Cl:
      |
  ••     ••
 :Cl—C—Cl:
  ••  |  ••
     :Cl:
      ••
```

Structure for SCl_2:

```
  ••    ••    ••
 :Cl—S—Cl:
  ••    ••    ••
```

Structure for NCl_3:

```
  ••        ••
 :Cl—N—Cl:
  ••    |     ••
       :Cl:
        ••
```

Question 23
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
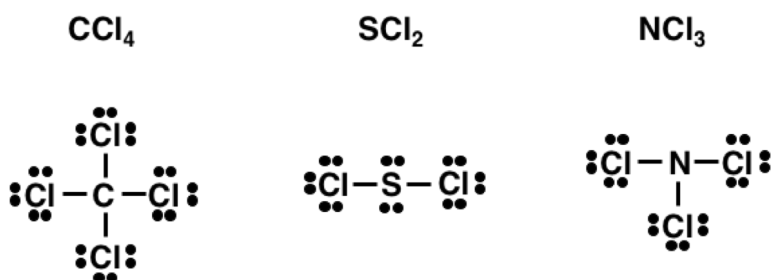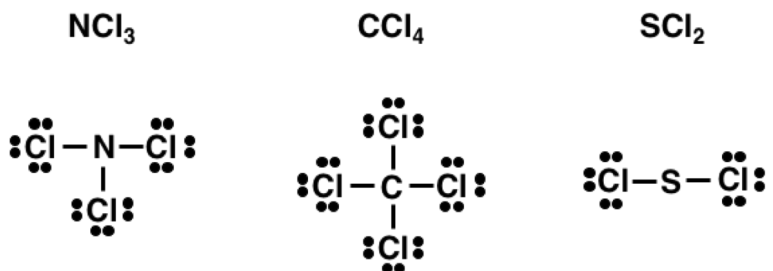
NCl_3 CCl_4 SCl_2

Structure for NCl_3:

```
  ••        ••
 :Cl—N—Cl:
  ••    |     ••
       :Cl:
        ••
```

Structure for CCl_4:

```
      ••
     :Cl:
      |
  ••     ••
 :Cl—C—Cl:
  ••  |  ••
     :Cl:
      ••
```

Structure for SCl_2:

```
  ••    ••    ••
 :Cl—S—Cl:
  ••    ••    ••
```

Question 24
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
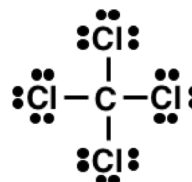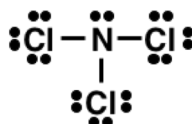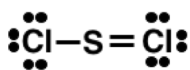
SCl_2 NCl_3 CCl_4

:Cl̈—S=C̈l: :C̈l—N̈—C̈l: structure for CCl_4 with central C bonded to four :C̈l: groups

Question Group 11
Question 25
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
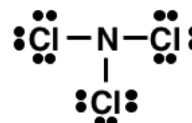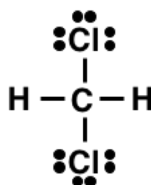
H_2O CH_2Cl_2 NCl_3

H—Ö—H   structure for CH_2Cl_2 with central C bonded to two H and two :C̈l: :C̈l—N—C̈l: with :C̈l: below

Question 26
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
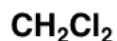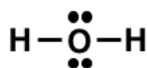
CH_2Cl_2 H_2O NCl_3

structure for CH_2Cl_2 with central C bonded to two :C̈l: and two :Ḧ:   H=Ö=H   :C̈l—N̈—C̈l: with :C̈l: below
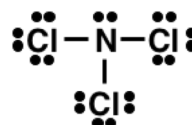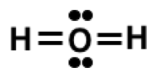
Question 27
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

O_2 CH_2Cl_2 H_2O

Ö=Ö

:C̈l:
|
:Ḧ—C—Ḧ:
|
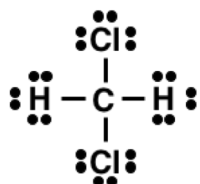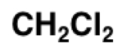:C̈l:

H—Ö—H

Question Group 12
Question 28
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

CO_2 NCl_3 H_2O

Ö=C=Ö

:C̈l—N̈—C̈l:
|
:C̈l:

H=O=H

Question 29
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
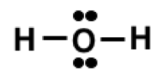
NF_3 CO_2 Cl_2

:F̈—N̈—F̈:
|
:F̈:

O=C̈=O

:C̈l—C̈l:

Question 30
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
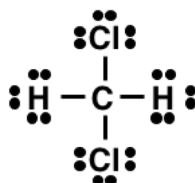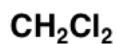
NF_3 H_2O CO_2

:F̈—N—F̈:
‖
:F̈:

H=O=H

Ö=C=Ö
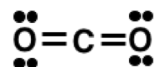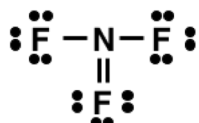
Activity 3 – Electron Dot Wizard
Question Group 13
Question 31
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
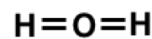
I_3^- $CO_3{}^{2-}$ CN^-

$[:\ddot{I}-\ddot{I}-\ddot{I}:]^-$ $\left[:\ddot{O}-C=\ddot{O}\atop :\ddot{O}:\right]^{2-}$ $[:C=N:]^-$
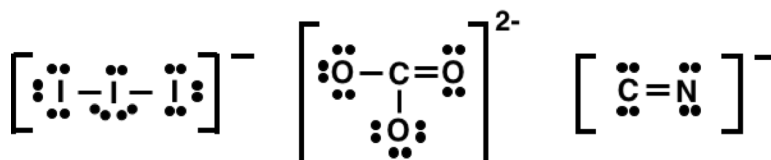
Question 32
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
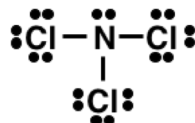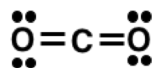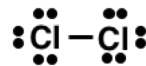
OH^- $CO_3{}^{2-}$ I_3^-

$[H-\ddot{O}:]^-$ $\left[:\ddot{O}-C=\ddot{O}\atop :\ddot{O}:\right]^{2-}$ $[:\ddot{I}-\ddot{I}=\ddot{I}:]^-$
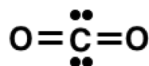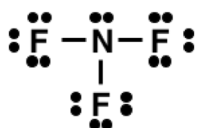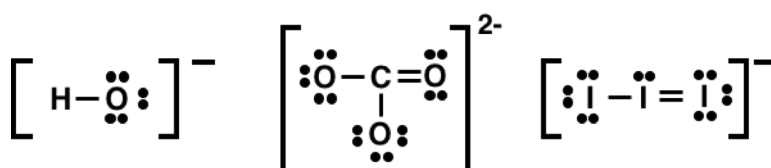
Question 33
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

CN⁻ $CO_3{}^{2-}$ $I_3{}^-$

$$\left[:C \equiv N: \right]^- \quad \left[:\ddot{O} - \overset{..}{C} - \ddot{O}: \atop :\underset{..}{\ddot{O}}: \right]^{2-} \quad \left[:\ddot{\underset{..}{I}} - \ddot{I} = \underset{..}{I}: \right]^-$$

Question Group 14
Question 34
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

$NO_3{}^-$ $ClO_2{}^-$ $SO_3{}^{2-}$

$$\left[:\ddot{O} - N = \ddot{O} \atop :\underset{..}{\ddot{O}}: \right]^- \quad \left[:\ddot{O} - \ddot{Cl} = \ddot{O} \right]^- \quad \left[:\ddot{O} - S = \ddot{O} \atop :\underset{..}{\ddot{O}}: \right]^{2-}$$

Question 35
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

$SO_3{}^{2-}$ $NO_3{}^-$ $ClO_2{}^-$

$$\left[:\ddot{O} - S = \ddot{O} \atop :\underset{..}{\ddot{O}}: \right]^{2-} \quad \left[:\ddot{O} - N = \ddot{O} \atop :\underset{..}{\ddot{O}}: \right]^- \quad \left[:\ddot{O} - \ddot{Cl} = \ddot{O} \right]^-$$

Question 36
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
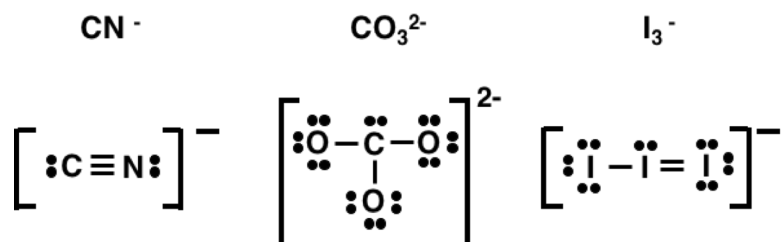
ClO_2^- SO_3^{2-} NO_3^-

$\left[\ddot{\underset{\cdot\cdot}{O}}-\ddot{\underset{\cdot\cdot}{Cl}}=\ddot{\underset{\cdot\cdot}{O}}\right]^-$ $\left[\ddot{\underset{\cdot\cdot}{O}}-\overset{\cdot\cdot}{S}=\ddot{\underset{\cdot\cdot}{O}}\right]^{2-}$ (with :O: below S) $\left[\ddot{\underset{\cdot\cdot}{O}}-\overset{}{N}-\ddot{\underset{\cdot\cdot}{O}}\right]^-$ (with :O: below N)

Question Group 15
Question 37
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
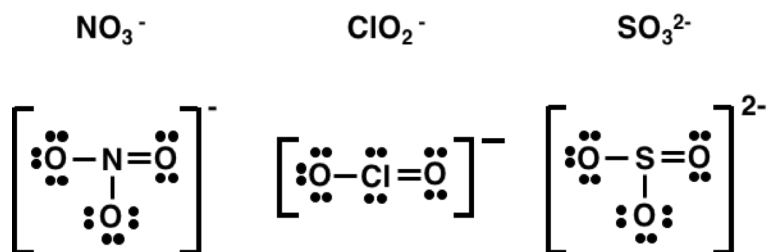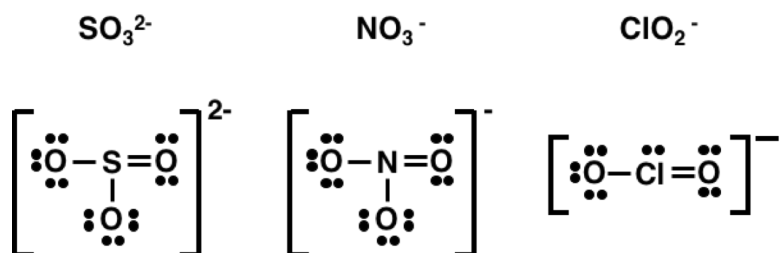
SO_4^{2-} XeF_4 ClO_2^-

$\left[\begin{array}{c} :O: \\ \| \\ :\ddot{O}-S-\ddot{O}: \\ \| \\ :O: \end{array}\right]^{2-}$ F–Xe–F structure with 4 F atoms around Xe $\left[\ddot{\underset{\cdot\cdot}{O}}-\ddot{\underset{\cdot\cdot}{Cl}}=\ddot{\underset{\cdot\cdot}{O}}\right]^-$

Question 38
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
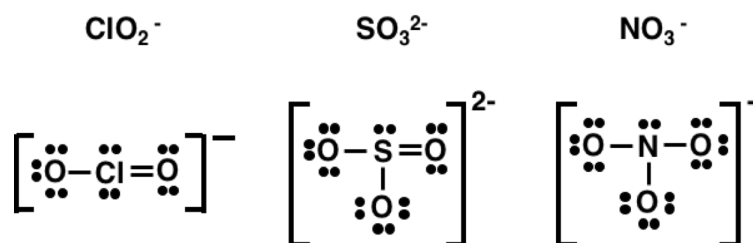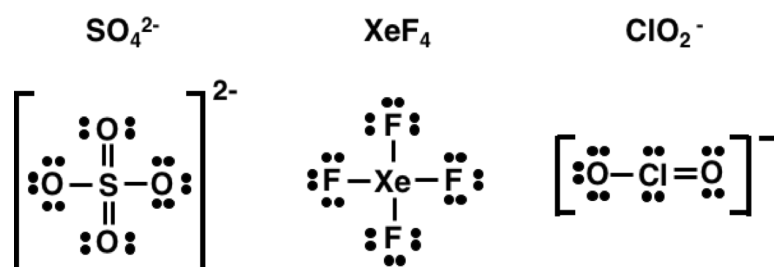
ClO_3^- SO_4^{2-} XeF_4

$\left[\begin{array}{c} \ddot{O}=Cl=\ddot{O} \\ | \\ :O: \end{array}\right]^-$ $\left[\begin{array}{c} :\ddot{O}: \\ \| \\ :\ddot{O}-S-\ddot{O}: \\ \| \\ :O: \end{array}\right]^{2-}$ F–Xe–F structure with 4 F atoms around Xe
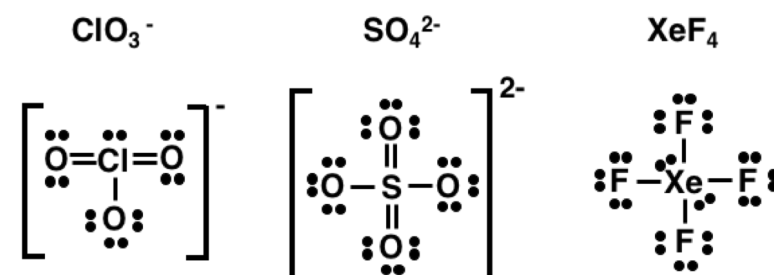
Question 39
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

XeF_4 ClO_2^- ClO_4^-

Question Group 16
Question 40
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
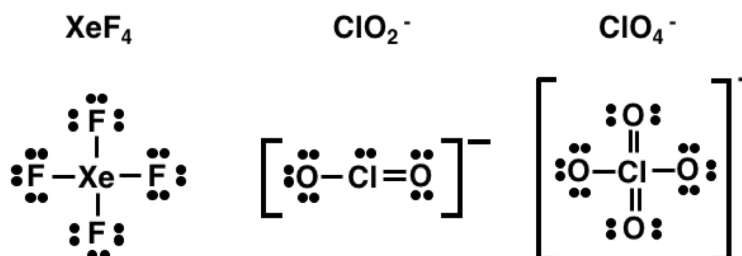
XeF_4 IO_3^- NO_2^-

Question 41
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
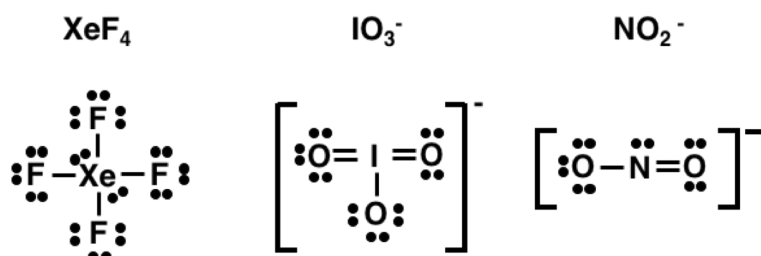
NO_2^- XeF_4 IO_3^-

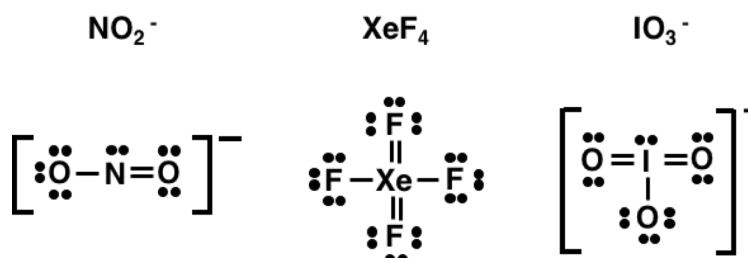## Question 42
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

IO_3^- NO_2^- XeF_4

Question Group 17
Question 43
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

ClO_3^- NO_3^- SO_2

Question 44
Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
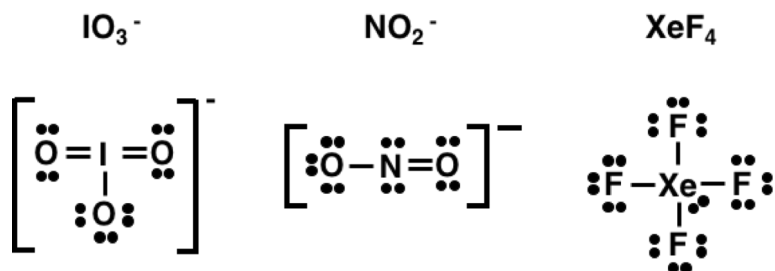
SO_2 ClO_3^- NO_3^-

Question 45

Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
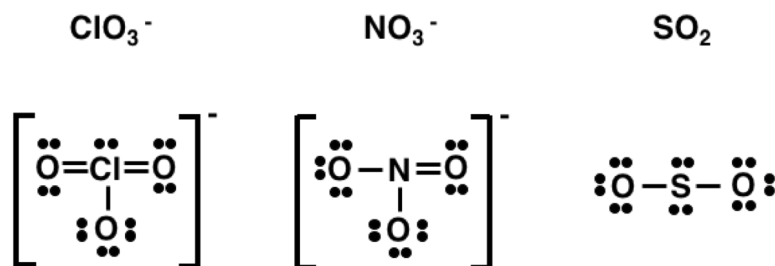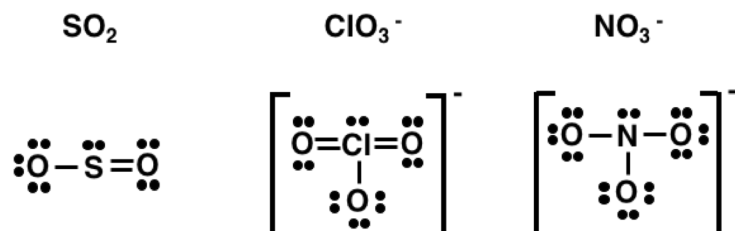
NO$_2^-$ SO$_2$ ClO$_3^-$

$\left[\ddot{\underset{..}{O}}-\ddot{N}=\ddot{O}\right]^-$ $\ddot{\underset{..}{O}}-\ddot{\underset{..}{S}}-\ddot{\underset{..}{O}}$ $\left[\ddot{\underset{..}{O}}-Cl=\ddot{\underset{..}{O}}\atop{\quad\overset{|}{\underset{..}{O}}}\right]^-$

Question Group 18

Question 46

Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
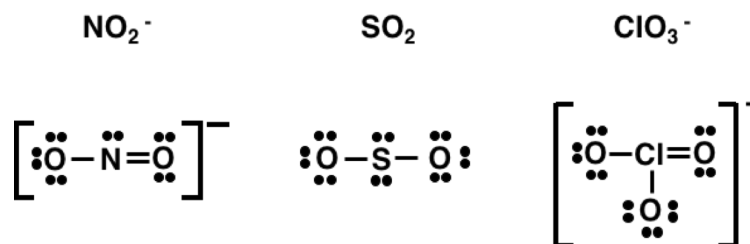
CS$_2$ CN$^-$ Cl$_2$

$\ddot{\underset{..}{S}}=C=\ddot{\underset{..}{S}}$ $\left[\ddot{\underset{..}{C}}-\ddot{N}\ddot{\,}\right]^-$ $\ddot{\underset{..}{Cl}}-\ddot{\underset{..}{Cl}}$

Question 47

Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.
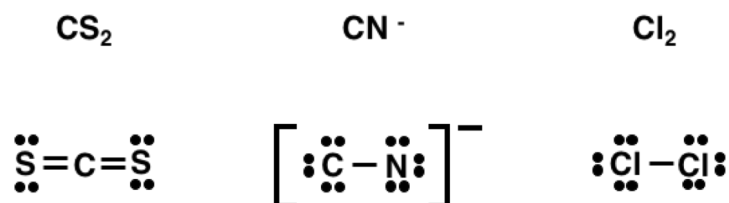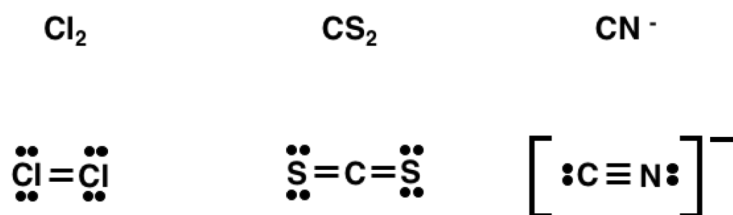
Cl$_2$ CS$_2$ CN$^-$

$\ddot{\underset{..}{Cl}}=\ddot{\underset{..}{Cl}}$ $\ddot{\underset{..}{S}}=C=\ddot{\underset{..}{S}}$ $\left[\,C\equiv N\,\right]^-$

Question 48

Consider the proposed Lewis structures for the stated formulas. Identify those that violate the rules for electron dot structures. Select all that apply.

CN⁻ Cl_2 CS_2

$$\left[\ddot{C}=\ddot{N} \right]^{-}$$:C̈l–C̈l: :S̈–C–S̈: