

1) What is a *fluorocarbon*?

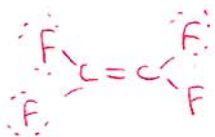
A compound that contains a carbon-fluorine bond.

2) In general, do these compounds occur naturally?

No.

3-5) Draw a correct Lewis structure (including lone pairs of electrons) for the following compounds:

3)  $C_2F_4$



4)



5) Difluorocarbene



6) What inorganic fluoride is the major component of the mineral fluorite (fluorspar)?

$CaF_2$

7) What does *perfluorinated* mean?

All available bonds are to fluorine (fully fluorinated)

8) Give one similarity between hydrogen and fluorine.

Both univalent, small, for NMR  $I = 1/2$ , forms stable poly-ethanes....

9) Give one similarity between fluorine and chlorine.

Halogens, usually forms one bond, 3 lone pairs with one  $\sigma$ -bond, electronegative, good leaving group...

10-13) Circle the molecule with the stronger  $\sigma$  bond:

10)  $CF_4$   $CCl_4$

11)  $CF_4$   $CH_4$

12)  $BF_3$   $BI_3$

13)  $F-F$   $Cl-Cl$

14-15) Name two physical properties that perfluorocarbons typically exhibit.

Liquids, colorless, good at dissolving  $O_2$ , very dense, .....

16-17) Why was World War II so beneficial to the progress of modern fluorine chemistry?

The interest in atomic bombs, which require enriched Uranium, is relevant to fluorine chemistry since the enrichment process uses  $UF_6$ .  $UF_6$  is prepared by reaction of  $UF_4$  with  $F_2$ . A lot of research into  $F_2$  reactions, and the handling of reactive substances generated many new fluorocarbon compound materials. This was called the "Manhattan Project".

18-20) What are the three characteristics that make fluorine such a special and unique substituent?

- ① The most electronegative element
- ② The 2<sup>nd</sup> smallest substituent next to Hydrogen.
- ③ It can form a stronger bond to carbon than Hydrogen can.