Comparison of C and Si

Similarities: Due to similar valence shell configuration they have some similarities.

- Both are non-metals.
- Both are abundant in nature.
- Both exhibit tetravalancy.
- Both exhibit common oxidation state of + 4
- Both will exhibit allotropy.
- Both will form many similar compounds.
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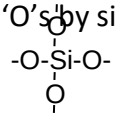
	Carbon	Silicon
Oxides	CO_2	SiO_2
Halides	CCl_4	$SiCl_4$
Hydrides	CH_4, C_2H_6, C_3H_8, etc.	SiH_4, Si_2H_6, Si_3H_8, etc.
Oxyacids	H_2CO_3 (Carbonic acid) $(COOH)_2$ (oxalic acid)	H_2SiO_3 (Silicic acid) $H_2Si_2O_4$ (Silico oxalic acid)

Differences: C & Si have some differences due to different (n – 1) shell configuration.

$C \rightarrow (n-1)s^2 \quad 2e^{\square}$

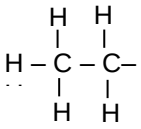
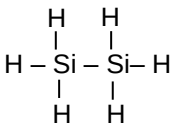
$Si \rightarrow (n-1)s^2p^6 \quad 8e^{\square}$

Carbon	Silicon
It is present in living beings.	It is present in minerals, rocks etc.
It is hard.	It is soft.
It has high m.p.	It has low m.p.
Its catenation ability is maximum.	Its catenation ability is limited.
Its maximum valency is 4.	Its maximum valency is 6.
Some allotropes of C are good conductors.	All its allotropes are bad conductors.

Differences in their compounds: Oxides	
CO_2 is gas.	SiO_2 is solid.
CO_2 exist as monomer & only weak Vanderwaal's forces exists.	SiO_2 is solid. SiO_2 has giant polymeric structure.
In CO_2, C is bonded to two 'O's by double bonds. O = C = O	In SiO_2, Si is bonded to four 'O's by single bonds. 
CO_2 is solube in water .	SiO_2 is insoluble in water.

Halides	
It forms CCl_4.	It forms $SiCl_4$.
As C does not contain vacant d orbitals in its valence shell, it cannot extend its valency beyond 4.	As Si contains vacant d-orbitals in its valence shell it can exhibit a valency of 6.

CCl_4 is saturated.	$SiCl_4$ is unsaturated and it can form two more bonds.
CCl_4 is insoluble in H_2O.	It is soluble in H_2O.
CCl_4 is not hydrolysed.	$SiCl_4$ is hydrolysed .
CCl_4 does not form species like $CCl_4.2H_2O$, CCl_6^{2-}.	It forms species like $SiCl_4.2H_2O$, $SiCl_6^{2-}$.
CCl_4 cannot act as Lewis acid.	$SiCl_4$ can act as Lewis acid

Hydrides	
It forms large number of hydrides.	It forms very few hydrides.
Its hydrides are stable because C – H bond is non polar & it doesnot weaken the adjacent C – C bond.	Silanes are unstable because Si – H bond is slightly polar & it weakens the adjacent Si – Si bond.
	
Hydrides of C are not hydrolysed due to non-polar nature .	They are hydrolysed due to polar nature.
These are weak reducing agents.	These are strong reducing agents.