

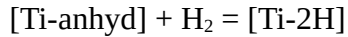
# Hydrous olivine defect reactions

## List of defects

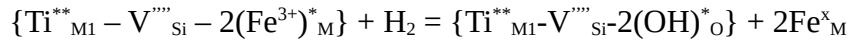
Description	Label	Kroger-Vink	Formula	Peak (cm <sup>-1</sup> )
Ti on an M site, likely M1, a Si vacancy and ferric iron	[Ti-anhyd]	$\{\text{Ti}^{**}_{\text{M1}} - \text{V}^{\text{''''}}_{\text{Si}} - 2(\text{Fe}^{3+})^*_{\text{M}}\}$	$\text{MgTiFe}_2\text{SiO}_8$	None
Titanium clinohumite. See, e.g., Walker et al. 2007	[Ti-2H]	$\{\text{Ti}^{**}_{\text{M1}} - \text{V}^{\text{''''}}_{\text{Si}} - 2(\text{OH})^*_{\text{O}}\}$	$\text{MgTiH}_2\text{O}_4$	3525, 3573
A Si vacancy and 4H <sup>+</sup>	[Si-4H]	$\{\text{V}^{\text{''''}}_{\text{Si}} - 4(\text{OH})^*_{\text{O}}\}$	$\text{Mg}_2\text{H}_4\text{O}_4$	3600
A Si vacancy and 4 ferric irons on M sites	[Si-anhyd]	$\{\text{V}^{\text{''''}}_{\text{Si}} - 4(\text{Fe}^{3+})^*_{\text{M}}\}$	$\text{Fe}_4\text{SiO}_8$	None
A Si vacancy, 2H <sup>+</sup> , and 2 ferric irons on M sites	[Si-2H]	$\{\text{V}^{\text{''''}}_{\text{Si}} - 2(\text{Fe}^{3+})^*_{\text{M}} - 2(\text{OH})^*_{\text{O}}\}$	$\text{Fe}_2\text{H}_2\text{O}_4$	3600
A metal vacancy, a ferric iron on an M site, and H <sup>+</sup>	[tri-H]	$\{\text{V}^{\text{'}}_{\text{M}} - (\text{Fe}^{3+})^*_{\text{M}} - (\text{OH})^*_{\text{O}}\}$	$\text{FeHSiO}_4$	3356
A metal vacancy and 4 ferric irons on M sites	[tri-anhyd]	$\{\text{V}^{\text{'}}_{\text{M}} - 2(\text{Fe}^{3+})^*_{\text{M}}\}$	$\text{MgFe}_2\text{Si}_2\text{O}_8$	None

## Fast diffusion in and out (decoration of pre-existing Ti defects)

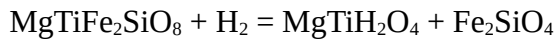
### Overview



### Kroger-Vink

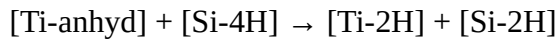


### Formula

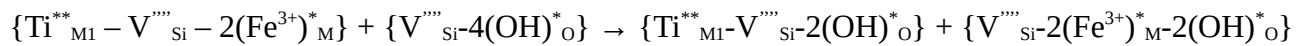


## Slow redistribution of H between Si vacancies

### Overview



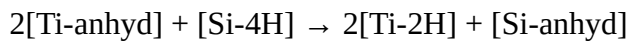
### Kroger-Vink



### Formula

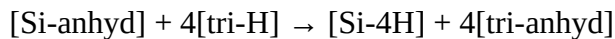


### Alternative: full dehydration of [Si]

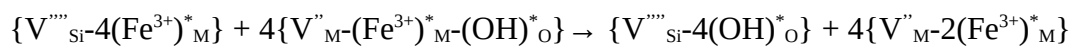


## Redistribution of H in Kilauea Iki at 800C

### Overview



### Kroger-Vink



### Formula

