

```

def p_c12__n13(tf):
    # c12 + p --> n13
    rate = 0.0

    # ls09n
    rate += np.exp( 17.1482 + -13.692*tf.T913i + -0.230881*tf.T913
                    + 4.44362*tf.T9 + -3.15898*tf.T953 + -0.666667*tf.lnT9)

    # ls09r
    rate += np.exp( 17.5428 + -3.77849*tf.T9i + -5.10735*tf.T913i + -2.24111*tf.T913
                    + 0.148883*tf.T9 + -1.5*tf.lnT9)

    return rate

```