

# Chapter 17

## Production rates for C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>6</sub> and C<sub>3</sub>H<sub>4</sub>

Combining all results from the model runs the evolution of the abundances of the C<sub>2</sub> and C<sub>3</sub> parents with heliocentric distance can be studied. Production rates for C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>6</sub> and C<sub>3</sub>H<sub>4</sub> have been determined in the heliocentric distance range from 2.86 - 4.74 AU. Table 17.1 lists the production rates with the associated errors (derived as described in section 19). The production rates for the two spatial directions in the night of Jan. 20, 1998 at 4.1 AU heliocentric distance have been averaged. The values derived for the spatial directions agree within the errors. A discussion of the effect of possible coma asymmetries for this night is given in section 19.

Distance [AU]	C <sub>2</sub> H <sub>2</sub>	C <sub>2</sub> H <sub>6</sub> [10 <sup>25</sup> s <sup>-1</sup> ]	C <sub>3</sub> H <sub>4</sub>
-3.39	120.±43.3	360.±178.	66.2±40.1
-2.86	260.±91.6	520.±268.	20.2±13.3
3.66	112.±39.1	340.±177.	54.6±32.8
3.78	69.5±24.2	100.±78.2	55.8±33.7
4.1	82.5±33.5	164.±127.	102.±70.2
4.14	77.3±26.5	219.7±117.	43.0±26.5
4.74	64.3±22.8	196.0±108.	65.2±41.1

Table 17.1: Production rates for C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>6</sub> and C<sub>3</sub>H<sub>4</sub> derived in this work

Figure 17.1 is a plot of the production rates of C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>6</sub> and C<sub>3</sub>H<sub>4</sub> versus heliocentric distance (green, red and blue squares and diamonds). Pre- and postperihelion values derived in this work are plotted using different symbols (square for pre- and diamond for post-perihelion) to show that there is no significant asymmetry around perihelion.

Also plotted are the C<sub>2</sub>H<sub>2</sub> and C<sub>2</sub>H<sub>6</sub> production rates (green and red triangles) obtained by Dello Russo *et al.* [2001] from infrared observations. The details of these measurements are described in section 6. The red dotted line is a fit to the production rates of C<sub>2</sub>H<sub>6</sub> given by and extrapolated to the distance range covered here. The values for the production rates

of  $C_2H_6$  determined in this work are in excellent agreement with this fit. For  $C_2H_2$  the green dashed line is a fit to the values for the production rates derived in this work. The extrapolation of this fit to small heliocentric distances is consistent with the values for  $C_2H_2$  measured by Dello Russo *et al.* [2001] near perihelion.

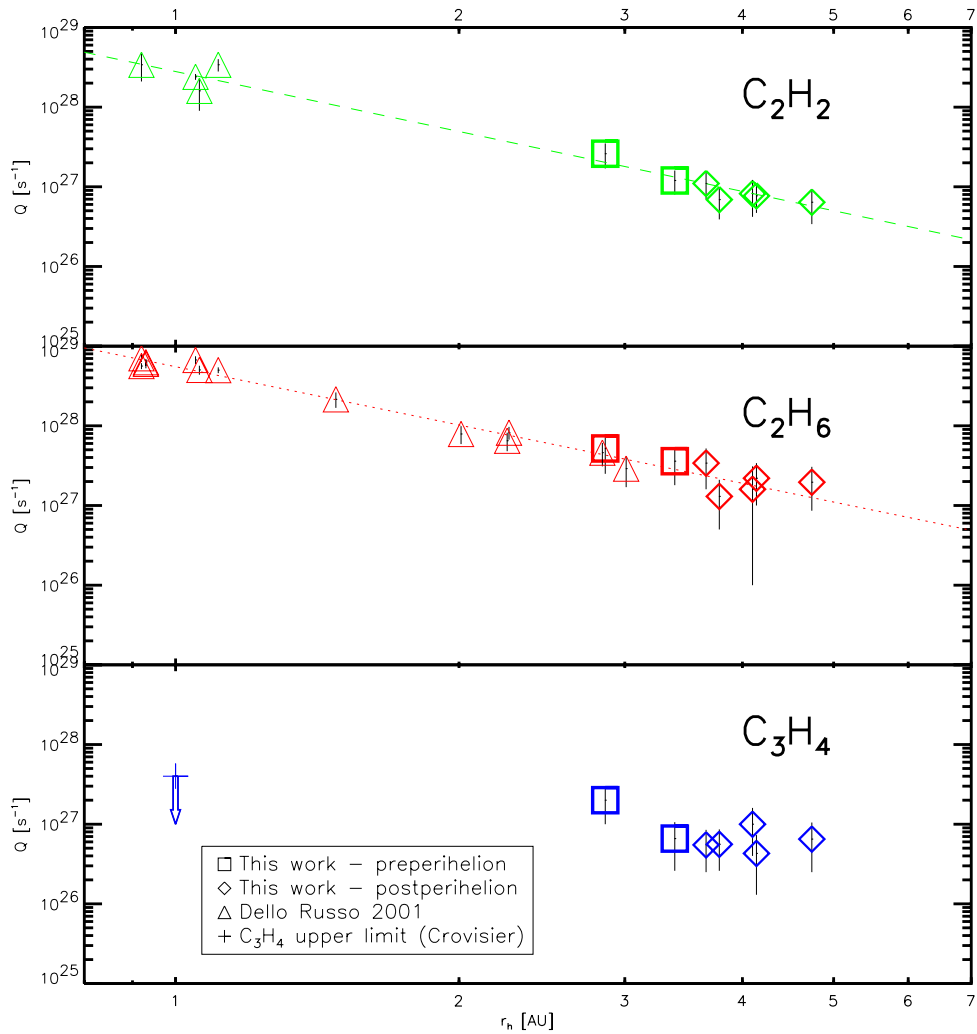


Figure 17.1: Evolution of abundance ratios over heliocentric distance

The value of  $Q(CH_3CCH) < 4 \cdot 10^{27} s^{-1}$  in figure 17.1 is a  $3\text{-}\sigma$  upper limit derived for propyne by Crovisier [2000] from observations of the J 13-12 group of lines at 222.167 GHz. The observations have been obtained at the IRAM interferometer on March 18, 1997. The production rates for  $C_3H_4$  obtained in this work are in agreement with this upper limit. Unfortunately until today none of the isomeric forms of  $C_3H_4$  has been detected in a comet.