**(Related to Fig.3**) Variation in the phenol removal efficiency with the phenol concentration in the presence of ozone gas only in a bubble column reactor.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time(min) | 15 ppm |  12 ppm | 9 ppm | 6 ppm | 3 ppm |
| 15 | 18.23844 | 20.80353 | 24.69182 | 26.32086 | 30.98463 |
| 30 | 30.69447 | 38.33726 | 43.09537 | 52.19681 | 60.42717 |
| 45 | 46.53974 | 56.051 | 59.62249 | 67.13791 | 81.22311 |
| 60 | 61.1786 | 67.57085 | 76.32774 | 85.41927 | 99.26245 |
| 75 | 74.72348 | 80.78316 | 85.8745 | 99.69508 | 100 |
| 90 | 85.69961 | 91.73834 | 99.69413 | 100 | 100 |
| 105 | 96.83288 | 99.91701 | 100 | 100 | 100 |
| 120 | 99.87912 | 100 | 100 | 100 | 100 |

**(Related to Fig.4**) Variation in the phenol removal efficiency with the phenol concentration in the presence of ozone gas and packing in a bubble column reactor.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (min) | 15 ppm | 12 ppm | 9 ppm | 6 ppm | 3 ppm |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 25.699 | 28.764 | 32.24683 | 35.8205 | 38.50645 |
| 30 | 38.2269 | 42.3772 | 52.97377 | 63.0035 | 74.98463 |
| 45 | 55.1122 | 60.207 | 69.8263 | 82.5329 | 98.4327 |
| 60 | 72.7848 | 77.2371 | 85.16081 | 98.5703 | 100 |
| 75 | 84.5565 | 89.2334 | 99.61998 | 100 | 100 |
| 90 | 93.2203 | 99.5926 | 100 | 100 | 100 |
| 105 | 99.5657 | 100 | 100 | 100 | 100 |
| 120 | 100 | 100 | 100 | 100 | 100 |

**(Related to Fig. 5** ) Effect of phenol dosages on the phenol removal efficiency at a contact time of 45 min using an O3/packing mode with an ozone concentration of 20.6 mg /L.

|  |  |
| --- | --- |
| Initial Concentration of Phenol mg/L | Removal Efficiency of Phenol mg/L at 45 min |
| 3 | 98.432 |
| 6 | 82.532 |
| 9 | 69.82 |
| 12 | 60.207 |
| 15 | 55.11 |

**((Related to Fig. 6**) Influence of the ozone dosage on the phenol degradation process in a bubble column reactor in the presence and absence of packing (at 3 mg/L phenol concentration and 45 min of contact time).

|  |  |  |
| --- | --- | --- |
| Ozone doze | Ozone at 3ppm | O3+packing at 3ppm |
| 10 | 52.04 | 70.48 |
| 15 | 69.34 | 87.707 |
| 20 | 83.56 | 100 |