Supplementary data

Systematically identifying and investigating key active component and its transformation mechanism in the process of purifying $TiCl_4$ with organic reagents

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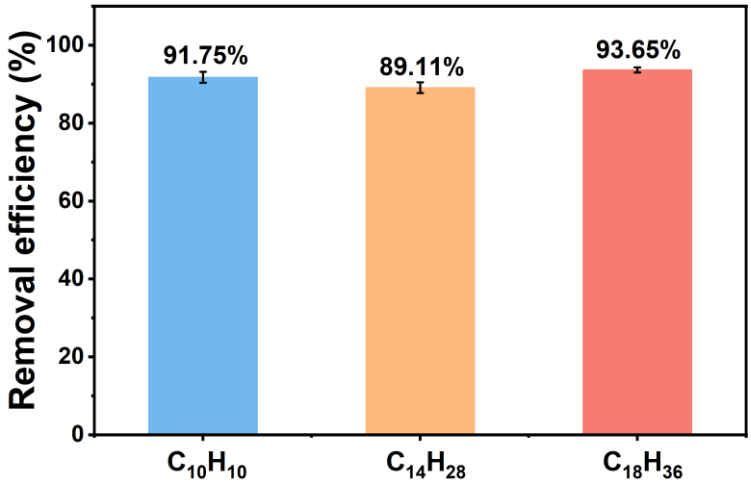


Fig. S1. Vanadium removal efficiency by 1-decene, 1-tetradecene, and 1-octadecene

Table S1. Variation in $VOCl_3$ mass fraction after different distillation times.

Time (min)	0	30	60	120	180	240
$VOCl_3$ (wt%)	0.980	0.752	0.461	0.107	0.092	0.086

Table S2. Variation in $VOCl_3$ mass fraction before and after distillation at different reaction temperatures.

Temp. (℃)	140	150	160	170	180
$VOCl_3$ (wt%) 0 min	0.913	0.980	0.645	1.146	1.164
$VOCl_3$ (wt%) 120 min	0.334	0.107	0.063	0.079	0.078

Table S3. Variation in $VOCl_3$ mass fraction before and after distillation with different 1-dodecene addition amounts.

1-Dodecene content(wt%)	0.25	0.50	0.75	1.00	2.00
$VOCl_3$ (wt%) 0 min	0.705	0.980	0.751	0.770	0.835
$VOCl_3$ (wt%) 120 min	0.108	0.107	0.063	0.096	0.099

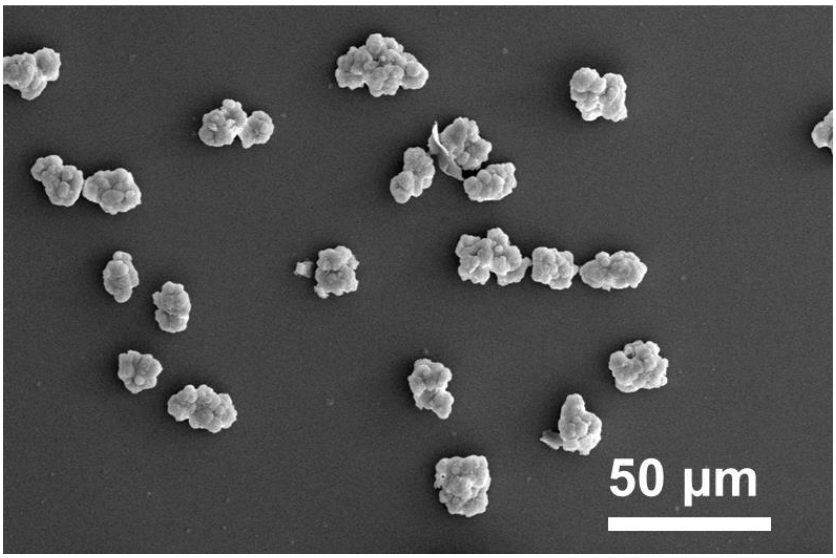


Fig. S2. Low-magnification SEM image of the residue.

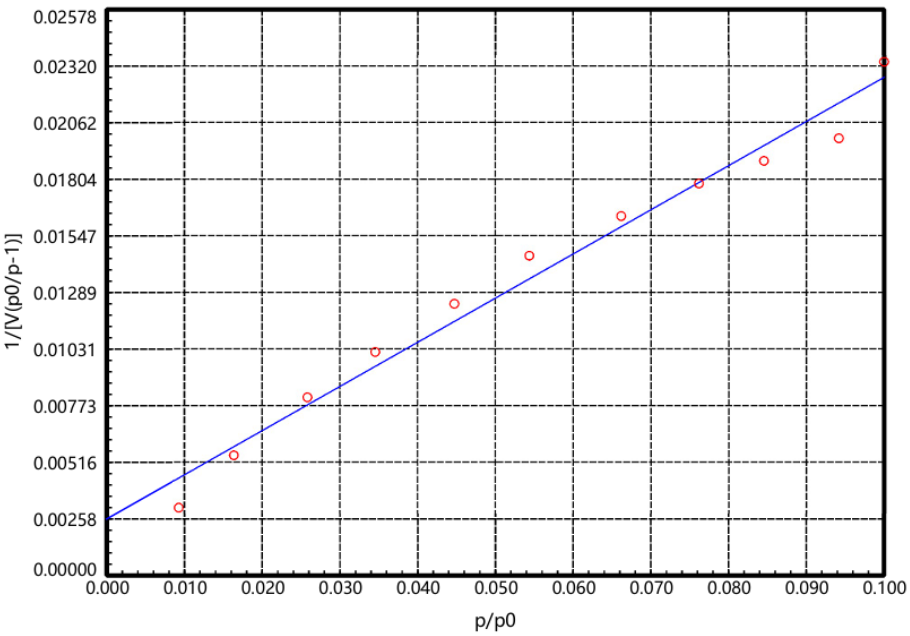


Fig. S3. Calculation chart of the specific surface area of residues.

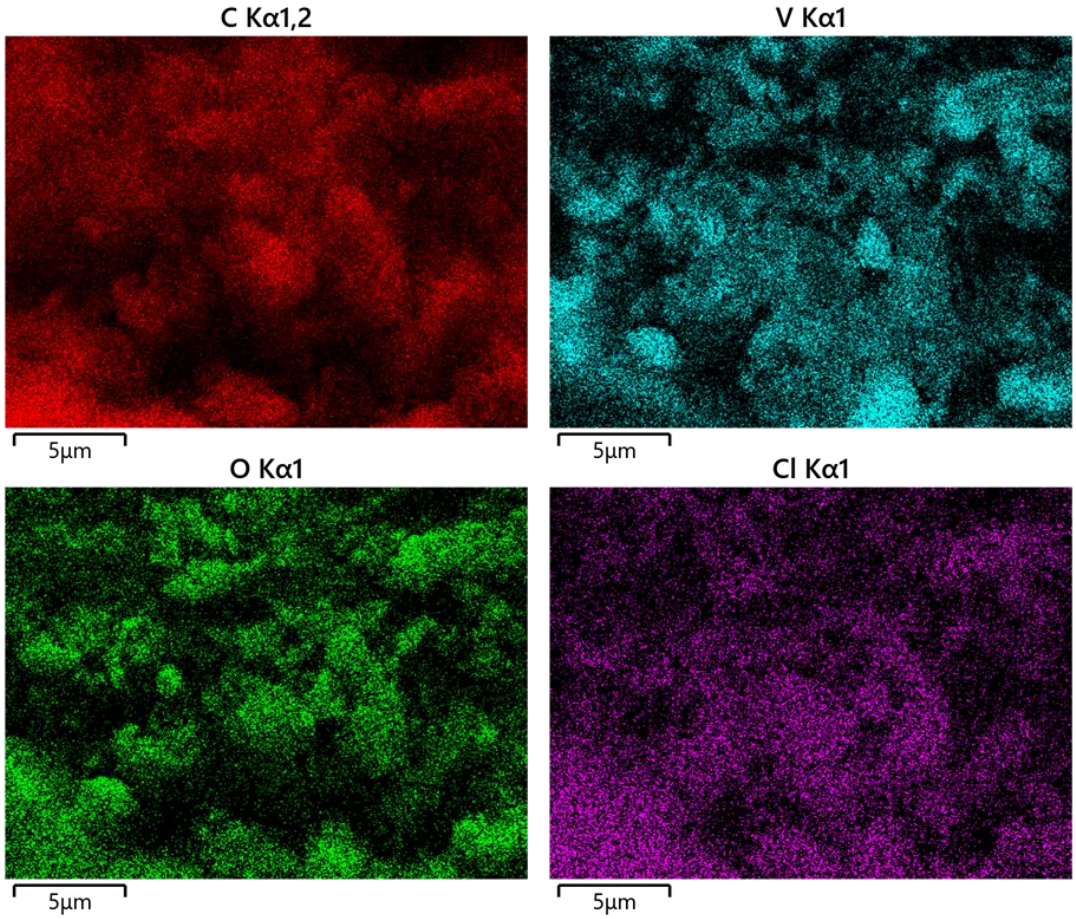


Fig. S4. EDS spectra of different elements in the residue.

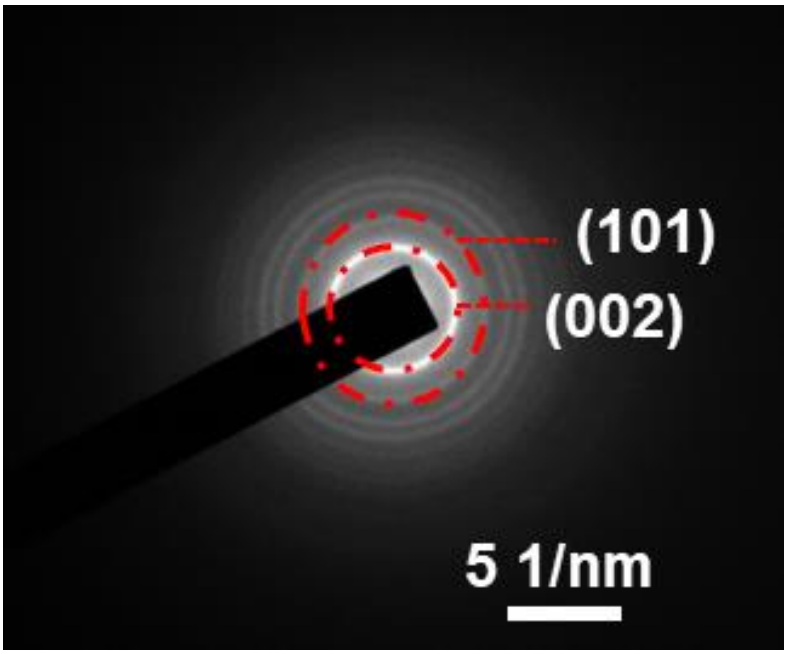


Fig. S5. Selected-area electron diffraction (SAED) pattern of residue.

Table S4. The composition of the intermediate product

Product	Content (%)
1-Dodecene	**26.72%**
Cyclododecane	**49.01%**
1-Chlorododecane	**4.29%**
Other alkenes	**8.62%**
Other alkanes	**5.28%**
Alcohol	**3.96%**
Carboxylic acid	**2.12%**

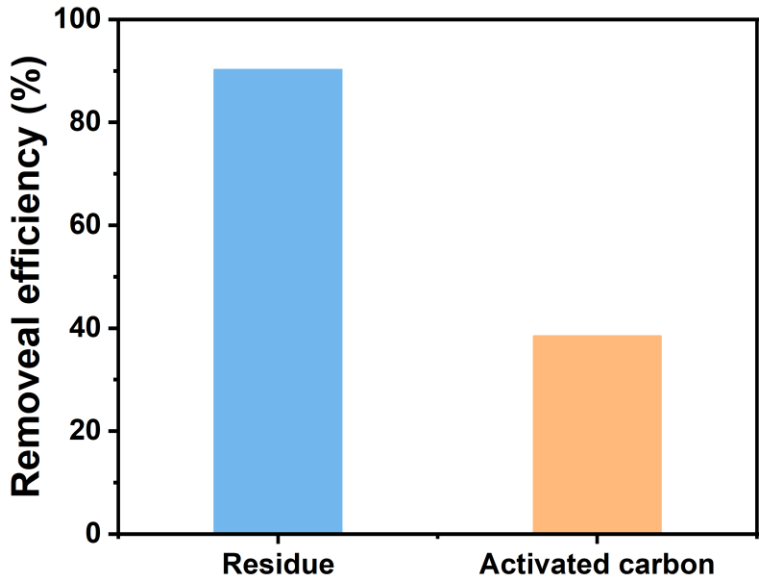


Fig. S6. Comparison of $VOCl_3$ removal efficiency by residue and activated carbon.