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**American Chemical Corporation**

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## 1. Estimation of WACC

### 1.1. Calculation details

For the calculation of the WACC we used the following parameters:

Riskfree	5.73	U.S. government bond USGG10YR Yearly average return of period: 1.1.1974 to 31.12.1978, source Bloomberg
Beta Assets	1.10	
Beta Stock	1.20	From the case study 9-280-102
Market Rm	8.56	S&P SPX Yearly average return of period: 1.1.1974 to 31.12.1978, source Bloomberg
Debt Ratio*	35.00%	Target capital structure
Equity Ratio*	65.00%	Target capital structure
Corp. Tax	48.00%	From the case study 9-280-102
Debt Interest	11.25%	From the case study 9-280-102
$k_E$	9.13%	By using the CAPM as shown below
$k_A$	9.22%	

The estimation of  $k_E$  is based on the CAPM as follows:

$$K_E = R_f + (R_m - R_f) \times \beta \rightarrow 5.73 + (8.56 - 5.73) \times 1.2 = \underline{\underline{9.13\%}}$$

### 1.2. Results

Finally, the WACC was calculated using  $k_E$  of 9.13% and the target debt / equity ratio of 35 / 65 considering a corporate tax rate of 48% (based on historical figures from the case). The weighted average cost of capital is then 7.98%.

$$WACC = k_D \cdot (1 - \tau_c) \cdot \left( \frac{D}{D + E} \right) + k_E \cdot \left( \frac{E}{D + E} \right)$$

## 2. Projection of the Incremental Cash Flows

### 2.1. Projected free cash flows

The table below shows the results of the free cash flow projections for the years 1980 to 1984. The appendix 6.2 shows the details that led to these results.

	1980	1981	1982	1983	1984
Free Cash Flows	\$1'212'160	\$1'422'360	\$1'912'200	\$2'095'680	\$2'093'520

### 2.2. Assumptions

- **Tax rate:** As Dixon considers to acquire the Collinsville Plant we based our calculation on Dixon's average tax rate of 48 %.
- **Economics of scale:** We did not take into account any cost saving due to the fact that Dixon would absorb a part of the sodium chlorate production themselves what would potentially reduce sales costs.

### 3. Net Present Value Using the WACC Method

#### 3.1. Net present Value

The NPV was calculated with the discount rate as computed in part 1 (WACC 7.98%). The result shows, that the net present value of this acquisition is slightly negative.

	1979	1980	1981	1982	1983	1984
Free Cash Flows		\$1'212'160	\$1'422'360	\$1'912'200	\$2'095'680	\$2'093'520
Salvage Value of the plant						\$7'560'000
Borrowing	-\$12'000'000					
Total	-\$12'000'000	\$1'212'160	\$1'422'360	\$1'912'200	\$2'095'680	\$9'653'520
Discounted Cash Flows (using WACC)	-\$12'000'000	\$1'122'578	\$1'219'896	\$1'518'810	\$1'541'529	\$6'576'110
Net present Value	-\$21'077					

#### 3.2. Assumptions

- Total investment cost  $I_0$  is the acquisition cost of \$12 Mio.
- Since there were only little information available what would happen after 1984 we decided to go for a conservative approach. Thus, we assumed a salvage value of \$6,190,000 at that the end of 1984 that is then taken into the NPV computation. The salvage value was computed by deducting the yearly depreciation until 1984 from the initial investment of \$12,000,000.
- There is no growth after year 5
- Projection for 10 years: We leave our projections at a five-year basis (this is already a long cycle for this industry) based on the fact that there are too many uncertainties between the 5<sup>th</sup> and the 10<sup>th</sup> such as the introduction of a new machine to cut costs dramatically or that the depreciation of the investment would not be in line with the current data.

### 4. Calculation of the Debt Tax Shield

The debt tax shield was computed by using the corporate tax rate of 48% (see table in part 1). As shown in the table below we calculated the interest tax savings by multiplying the corporate tax rate of 48% times the interest payments. We have two salvage values here

- Salvage Value of the Plant: Calculated by adding up the salvage of the M\$10.6 (book value of the acquisition) + the salvage value of the additional investments done every year (see attachment)
- Salvage value of the debt tax shield: The bond takes 15 years in total to repay. The remaining years are accumulated in 1984 and discounted from there using  $k_D$ .

The debt tax shield for the full 15 years is in the attachment. Here are the forecast period years as well as the present value of the full period.

Debt Tax Shield						
	1979	1980	1981	1982	1983	1984
Interest Tax Savings 15y Bond		\$306'000	\$306'000	\$306'000	\$306'000	\$306'000
Interest Tax Savings Note		\$153'000	\$128'555	\$101'359	\$71'104	\$37'445
<b>Total Interest Tax Shield</b>		<b>\$459'000</b>	<b>\$434'555</b>	<b>\$407'359</b>	<b>\$377'104</b>	<b>\$343'445</b>
Discounted Debt Tax Shield (with $k_D$ )		\$412'584	\$351'111	\$295'854	\$246'185	\$201'538
<b>NPV of debt tax shield</b>	<b>\$2'173'178</b>					

## 5. Net Present Value Using the APV Method

### 5.1. APV Method

For the computation of the NPV with the APV methodology we used the same free cash flow as for the WACC computation. The same is applied for the salvage value of the plant (see assumptions in part 3). Additionally, we had to consider the “salvage value” of the debt tax shield. This value was calculated by considering all yearly tax shields from 1985 plus 10 years (maturity of the 15 year bond). This salvage value is the equally treated as the salvage value of the plant.

The estimation of  $k_A$  is computed by using the following formula:

$$K_A = k_D \frac{D}{D+E} + k_E \frac{E}{D+E} \rightarrow 0.125 \times 0.35 + 0.083 \times 0.65 = \underline{\underline{9.22\%}}$$

and the NPV is computed by using the following formula:

$$NPV = -I_0 + \sum_{t=1}^T \frac{FCF_t}{(1+k_A)^t} + DS$$

	1979	1980	1981	1982	1983	1984
Free Cash Flow		\$1'511'780	\$2'573'880	\$3'163'100	\$3'278'440	\$3'267'160
Interest Tax Savings		\$459'000	\$434'555	\$407'359	\$377'104	\$343'445
Salvage Value of Plant						\$7'560'000
Salvage Value of Debt Tax Shield						\$1'134'783
Borrowing	-\$12'000'000					
	-\$12'000'000	\$1'970'780	\$3'008'435	\$3'570'459	\$3'655'544	\$12'305'389
Discounted Cash Flows ( $k_A$ )	-\$12'000'000	\$1'704'274	\$2'249'796	\$2'309'022	\$2'044'359	\$5'951'163
<b>NPV of the acquisition</b>	<b>\$2'258'615</b>					

### 5.2. Assumptions

- It is assumed that the DTS has the same risk as the firm's operating assets.

## 6. Appendix

### 6.1. Debt Tax Shield

Debt Tax Shield												
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Interest Tax Savings 15y Bond		\$306'000	\$306'000	\$306'000	\$306'000	\$306'000	\$306'000	\$275'400	\$244'800	\$214'200	\$183'600	\$153'000
Interest Tax Savings Note		\$153'000	\$128'555	\$101'359	\$71'104	\$37'445						
<b>Total Interest Tax Shield</b>		<b>\$459'000</b>	<b>\$434'555</b>	<b>\$407'359</b>	<b>\$377'104</b>	<b>\$343'445</b>	<b>\$306'000</b>	<b>\$275'400</b>	<b>\$244'800</b>	<b>\$214'200</b>	<b>\$183'600</b>	<b>\$153'000</b>
Discounted Debt Tax Shield (with kd)		\$412'584	\$351'111	\$295'854	\$246'185	\$201'538	\$161'407	\$130'576	\$104'330	\$82'058	\$63'223	\$47'358
<b>NPV of debt tax shield</b>	<b>\$2'173'178</b>											

### 6.2. Incremental Cash Flow

Free Cash Flow						
<b>Revenues</b>		13'280	16'800	19'760	21'356	23'028
Minus operating Expense		11'387	13'472	15'565	17'012	18'732
Minus Depreciation		1'060	1'110	1'160	1'210	1'270
<b>EBIT</b>		'833	2'218	3'035	3'134	3'026
Minus Tax on EBIT		'400	1'065	1'457	1'504	1'452
Plus Depreciation		1'060	1'110	1'160	1'210	1'270
Minus non-cash relev. Revenues		'0	'0	'0	'0	'0
<b>Gross Cash Flow</b>		1'493	2'263	2'738	2'840	2'844
<b>Increase in Net Working Capital</b>						
Minus Increase in A/R		'294	-'352	-'296	-'160	-'167
Plus Decrease in Inventories		'53	-'158	-'133	-'72	-'75
Minus Decrease in A/P		-'143	'194	'163	'88	'92
Additional capital investment		-'485	-'525	-'560	-'600	-'600
<b>Free Cash Flow</b>		1'212	1'422	1'912	2'096	2'094

